Final Program
Forty Seventh Annual Meeting
International Neuropsychological Society

February 20-23, 2019
New York, NY, USA

WEDNESDAY, FEBRUARY 20, 2019

9:00 AM–12:00 PM — **CE Workshop 1. The Use of Neuroimaging and Computational Approaches to Inform Interventions for Mood Disorders**
Presenter: Faith Gunning
West Side Ballroom Salon 2

1. GUNNING, F — The Use of Neuroimaging and Computational Approaches to Inform Interventions for Mood Disorders

9:00 AM–12:00 PM — **CE Workshop 2. Cognitive Control Dysfunction and Rehabilitation: Major Theories and Component Process Dysfunction in Traumatic Brain Injury and Psychopathology**
Presenter: Michael J. Larson
West Side Ballroom Salon 4

1. LARSON, MJ — Cognitive Control Dysfunction and Rehabilitation: Major Theories and Component Process Dysfunction in Traumatic Brain Injury and Psychopathology

9:00 AM–12:00 PM — **CE Workshop 3. If Only I had a Crystal Ball: The Role of Functional Neuroimaging in Predicting Future Cognitive Function in Children with Epilepsy**
Presenter: Amanda Wood
West Side Ballroom Salon 1

1. WOOD, A — If Only I had a Crystal Ball: The Role of Functional Neuroimaging in Predicting Future Cognitive Function in Children with Epilepsy

12:00–1:00 PM — **Lunch (On Own)**
Conference-Wide

12:00–1:00 PM — **INS Business Meeting**
West Side Ballroom Salon 3

1:00–4:00 PM — **CE Workshop 4. Contextually Valid Executive Assessment (ConVExA): A New Approach to Addressing Ecological Validity in Assessment of Executive Functions**
Presenter: Yana Suchy
West Side Ballroom Salon 2

1. SUCHY, Y — Contextually Valid Executive Assessment (ConVExA): A New Approach to Addressing Ecological Validity in Assessment of Executive Functions

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1:00–4:00 PM **CE Workshop 5. Mapping Cognition Along the Continuum of Alzheimer's Disease: Towards Novel Assessments, Affordable Biomarkers, and Technology-Driven Interventions**
Presenter: Mario A. Parra
West Side Ballroom Salon 4

1. PARRA, MA — Mapping Cognition Along the Continuum of Alzheimer's Disease: Towards Novel Assessments, Affordable Biomarkers, and Technology-Driven Interventions

1:00–4:00 PM **CE Workshop 6. Social Communication: Awkward to Assess and Treat, Critical for Successful Long-Term Outcome**
Presenter: Lyn Turkstra
West Side Ballroom Salon 1

1. TURKSTRA, L — Social Communication: Awkward to Assess and Treat, Critical for Successful Long-Term Outcome

2:30–4:00 PM **INS Student Liaison Committee Workshop: Feedback that Sticks: The Art of Communicating in the Language of our Patients**
Presenter: Karen Postal
West Side Ballroom Salon 3

2:30–3:45 PM **Poster Session 1. Aging**
Broadway Ballroom South and Majestic Complex

Aging

1. ACEVEDO-MOLINA, MC — Cognitively Normal Older Adults Show Elevated Semantic Detail Generation for Multiple Forms of Autobiographical Memory Retrieval
2. APOSTOLOU, HL — Longitudinal Associations Between Social Relations and Cognitive Aging
3. ARIAS, F — Exploratory Factor Structure of the Digestive Health Questionnaire
4. BANERJEE, N — Neuropsychological Correlates of Subjective Fatigue in Aging Adults
5. BARBA, C — Early-Life Infectious Disease and Risk of Incident Cognitive Impairment in a Population-Based Sample of Older Adults in Puerto Rico
6. BEAULIEU, C — Age-Related differences in negativity bias to emotional facial expressions : An Event-Related Potential (ERP) study
7. BERTOLA, L — Cognitive stability predictors differ between older adults with normal cognition and Mild Cognitive Impairment
8. BOEVE, AR — Music as a Cognitive Intervention in Older Adults
9. BRAGG, TL — Applying a Conceptual Model of Capacity Assessment
10. BROWN, S — Micronutrient Status and Cognition: A Longitudinal Geriatric Case Study
11. CASTELLS-SÁNCHEZ, A — Aerobic Fitness, a Key Factor of Cognitive Health in Adults and its Structural and Functional Brain Correlates
12. CHANG, H — Qualitative Analysis of Boundary Extension and Potential Compensatory Processes in Memory among Normal Elderly Individuals: A Preliminary Study
13. CHEN, M — Mediating effect of attention and executive functions on the relationships between subjective sleep quality and task performances during single- and dual-task gait among older adults
14. COOPER, S — Multiple Cognitive Domains Predict Progression from Cognitively Normal to MCI and Alzheimer's Disease
15. COTTER, D — Aging and Positive Mood: Longitudinal Neurobiological and Cognitive Correlates
16. CUNNINGHAM, KR — Comparing Functional Abilities Between Healthy Older Adults and Those with Cognitive Impairment Using the Night Out Task
17. DEL BENE, VA — Detecting Cognitive Impairment in Physicians
18. DIXON, JS — Ethnic Group Differences in Predictors of Cognitive Performance for Midlife Women
19. ECONOMOU, A — Intraindividual Variability Within and Across Conditions in Driving Simulator Measures of Healthy Drivers of Different Ages
20. ELKANA, O — Gait Measures Predict Cognitive Decline in Highly Educated Older Adults: 4-years Longitudinal Study
21. EVANGELISTA, ND — APOE Genotype Differentially Affects the Relationship Between Myelin Integrity and Memory Performance in Nondemented Older Adults
22. FALZARANO, F — Examining Sex Differences in Neurocognitive Functioning across Adulthood
23. FALZARANO, F — How Much Variance in Neurocognitive Functioning in Older Adults can be Explained by Neuroimaging Markers of Brain Volume and Small Vessel Cerebrovascular Disease?
24. FOX, EC — Greater adherence to the MIND diet is associated with lower amyloid burden and better memory and mood in clinically normal older adults
25. GERMAIN, J — Resting State Brain Network Dysfunction and Cognition in Late Life Depression
26. GIORDANI, B — Analysis of NIH Toolbox-Cognition Measures and Their Correlation to Driver Physiological Signals Recorded During Challenging Real-World Driving

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70. ROTBLATT, L — The Effect of Hypertension, Antihypertensive Treatment, and ApoE4 Genotype on Predicted MCI and Dementia Status in NACC
71. SAARELA, C — The Effect of Using Subjective or Objective Emotional Word Content Ratings on Age Differences in Memory
72. SALMINEN, LE — Neuroimaging Markers of Perinatal Smoke Exposure Later in Life: An Analysis of the UK Biobank Cohort
73. SAURMAN, JL — Longitudinal Measurement Invariance of the Auditory Verbal Learning Test in the Alzheimer's Disease Neuroimaging Initiative
74. SEEHRA, S — Percent of Life Spent in the United States and Late-Life Cognition in Caribbean, Central and South American-Born Immigrants
75. SKVARC, DR — Depression Increases the Risk of Post Operative Cognitive Dysfunction in Elderly, Major, Non-Cardiac Surgery Patients
76. SUMIDA, C — Financial Capacity in a Community Dwelling Sample: Correlations Between Performance-Based Measures and Self-Report Bill Payment Methods
77. SUNDERARAMAN, P — Understanding Financial Decision-Making in Older Adults: Examining Impulsivity, Risk-Taking, and Well-Being
78. SWAMINATHAN, S — Active Musical Engagement and Cognitive Abilities in Older Adults: A Systematic Review
79. THOMPSON, JL — Education and Word Reading in Older Adults with Changes in Socioeconomic Status
80. TORRES, VL — Types of Errors on a Novel Semantic Interference Task in Mild Cognitive Impairment and Alzheimer's Disease
81. TURCHAN, M — Clinical and demographic factors influence the discrepancy between self- and informant-subjective cognitive decline
82. TURNER, SM — Allocentric Search Strategy Use in a Spatial Navigation Task Reveals Differences in Normal and Abnormal Aging
83. UNGRADY, M — Specificity of the Montreal Cognitive Assessment (MoCA) in Minority Cognitive Aging: A Longitudinal Investigation
84. VAKIL, E — Eye Movements as a Potential Factor for Facilitating Memory Retrieval in Older Adults
85. VANDEBUNTE, AM — Positive Panic: The Effect of Anxiety on Auditory Attention
86. WADE, JB — Successful Aging: The Relationship Between Spirituality and Happiness in Neurological Disorders
87. WALTERS, SM — Longitudinal Decline in Global Efficiency of the Brain's Functional Connectome is Specifically Associated with Declining Processing Speed in Functionally Normal Older Adults
88. WEISENBACH, S — Resting State Brain Network Connectivity Predicts Cognition in Healthy Older Adults
89. WEISSBERGER, G — Financial and Health Literacy Discrepancies with Cognition in Older adults
90. WEISSBERGER, G — Functional Connectivity of the Insula in Financially Exploited Older Adults: Preliminary Findings from the Finance, Cognition, and Health in Elders Study (FINCHES)
91. WESBECHER, KD — Meaning in Life and Positive Neuropsychological Processes in Older Adults: Cognitive Control, Positive Reappraisal and Perceived Stress
92. WOOLVERTON, CB — Cognitive and Social Benefits Following Brief Social Intergenerational Interactions Among Older Adults
93. XIA, Y — Differential Utility of Self- and Informant-Rated Cognitive Complaints in Non-Demented Older Adults
94. YAZDANI, N — Examining Processing Speed as a Predictor of Subjective Well-Being across Age and Time in the German Aging Survey
95. YING, G — The Influence of Family Social Ties and Emotional Support on the Trajectory of Cognitive Decline in a Multi-Ethnic Cohort
96. ZAHEED, AB — Perceived Control may Buffer the Indirect Effect of Stress on Memory in Older Adults
97. ZLATAR, ZZ — Passive Rather than Active Sedentary Behaviors are Associated with Worse Executive Functions in Older Adults

Dementia (Non-AD)

98. AZAR, M — Differences in the clinical presentation of autopsy-confirmed Alzheimer's disease (AD) versus AD plus Lewy Body Disease (LBD)

MCI (Mild Cognitive Impairment)

99. BULL, TP — Predicting On-Road Driving Performance with the TMT and UFOV in Older Adults on a Continuum of MCI

Other

100. SANBORN, V — Poorer Attention is Associated with Reduced Adherence in a Clinical Trial
101. TRAN, V — Neuropsychological and MRI Findings in a Sample of Older Adults with Hyperlipidemia

4:15–4:30 PM **Program Welcome**
Program Committee Chair: Michael Kirkwood
Broadway Ballroom North and Shubert Complex

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4:30–5:30 PM **Plenary A. (INS Presidential Address) Concussion Outcomes in Children: Facts, Fictions, and the Future**
Presenter: Keith Yeates
Broadway Ballroom North and Shubert Complex

1. YEATES, K — Concussion Outcomes in Children: Facts, Fictions, and the Future

5:30–6:30 PM **INS Awards Ceremony**
Awards Committee Chair: Roy P. Kessels
Broadway Ballroom North and Shubert Complex

6:30–7:30 PM **Welcome Reception Sponsored by Faculty of Arts at U of Calgary**
Broadway Lounge

THURSDAY, FEBRUARY 21, 2019

7:20–8:50 AM **CE Workshop 7. Cognitive Recovery: The Power of Treatment in the Opioid Crisis**
Presenter: Monica G. Rivera Mindt
West Side Ballroom Salon 2

1. RIVERA MINDT, MG — Cognitive Recovery: The Power of Treatment in the Opioid Crisis

7:20–8:50 AM **CE Workshop 8. Autism Spectrum Disorders Across The Adult Lifespan. What do we know and what do we need to know?**
Presenter: Rebecca A. Charlton
West Side Ballroom Salon 4

1. CHARLTON, RA — Autism Spectrum Disorders Across The Adult Lifespan. What do we know and what do we need to know?

8:00–9:00 AM **Mid-Career Award Presentation: Reconsidering Harbingers of Alzheimer's Disease: Risk Factors, Biomarkers, and White Matter Hyperintensities**
Award Recipient: Adam M. Brickman
Broadway Ballroom North and Shubert Complex

1. BRICKMAN, AM — Reconsidering Harbingers of Alzheimer's Disease: Risk Factors, Biomarkers, and White Matter Hyperintensities

8:00–9:15 AM **Poster Session 2. Assessment**
Broadway Ballroom South and Majestic Complex

Assessment/Psychometrics/Methods (Adult)

1. ABRAMS, DN — Case Report on the African Neuropsychological Battery in the Assessment of Brain Injury
2. AXELROD, J — Written and Oral Trails Paradigms: Nonequivalent Measures of Executive Functioning in a Mixed Clinical Sample
3. BABICZ, MA — Does the Key Task Measure Prospective Memory?: Cautionary Findings from Parallel Studies in HIV Disease and Older Adults
4. BAGGER, JE — Using the NIH Toolbox Cognition Battery in an Acute Meal Intervention with Older Adults: A Feasibility Study
5. BEAN, PS — The Effect of Test Difficulty on Self-Reported Memory Ability
6. BREARLY, TW — Visual Teleneuropsychological Testing by Videoconference: Examining the Role of Test Characteristics and Examinee Functional Vision
7. BURKE, T — Addenbrooke's Cognitive Examination-III: A Process-Based Approach Version for the Improvement of Cognitive Screening in Dementia
8. CALVO, D — Utility of the 3MS and MMSE in Predicting Subcortical and Cortical Cognitive Impairment
9. CARVALHO, J — Factor Structure of the RBANS in Patients with Huntington's Disease
10. CESSNA PALAS, JM — Development of a Delayed Visual Memory Trial for the Consortium to Establish a Registry for Alzheimer's Disease (CERAD) Battery
11. CHOWDHRY, S — Digitized Clock Drawing as a Cognitive Screening Tool to Identify Executive Dysfunction in Metabolic Syndrome
12. COCHRANE, M — Examining Client Perceptions of the Neuropsychological Assessment: A Mixed Methodological Approach

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Assessment/Psychometrics/Methods (Child)

Concussion/Mild TBI (Adult)

Forensic Neuropsychology/Malingering/Noncredible Presentations

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98. BEACH, JD — Perceptions of Malingering Base Rates across Healthcare Professions
99. BICHLMEIER, A — Evaluation of a Recognition Trial for the Symbol Digit Modalities Test as a Performance Validity Measure in Acute and Chronic Traumatic Brain Injury
100. BRAW, YC — Per-Item Response Time Measurements in the Performance Validity Subtests of the Word Memory Test: Usefulness for the Detection of Feigned Cognitive Impairment
101. CAVACO, S — Detecting feigned memory impairment: clues from oculomotor behavior
102. CERTILMAN, CF — Use of the Gordon Diagnostic System to Assess Performance Validity in Veterans with Mild Traumatic Brain Injury
103. CROW, AJ — Reaction Time and Performance Consistency as Indicators of Performance Validity: A Preliminary Investigation using the Victoria Symptom Validity Test
104. ERICKSON, S — Dispelling Folklore About Trial One Memory and Digit Span Forward Differences
105. GAASEDELEN, O — Validation of a Novel Symptom Validity Test for the Personality Assessment Inventory Utilizing an Item Response Theory Framework
106. GREHER, MR — Classification Accuracy of Multiple Embedded Performance Validity Tests in a Sample of Patients with Multiple Sclerosis
107. HOLMQVIST, S — Contributions of Trauma-Related Indicators to Cognitive Deficits Among Delinquent Girls
108. JONES, EA — Neurocognitive Contributions to Recidivism Among Early-Onset Persistent Delinquent Youth
109. KANSER, RJ — Detecting Simulated Traumatic Brain Injury with Eye-tracking
110. LOPEZ-HERNANDEZ, WD — Evaluation of the new Dot Counting Test Cut-Off Score in Acute and Chronic Traumatic Brain Injury
111. MCFARLAND, MG — Relationship between General Intelligence and Performance Validity in Latin Americans with TBI
112. MOURAS, JO — Examining the TOMM Comparing Trial 2 and Consistency Between Trial 1 and 2 to Determine Effort
113. NAKHUTINA, L — Assessment of Performance Validity in a Clinical Sample of African-Caribbean Adults with Neurological Impairments
114. O'CONNELL, D — The Association Between Psychopathic Personality Traits and Executive Functions
115. ORY, JH — Is Effort on Neuropsychological Testing Predictive of Overutilization of Healthcare Resources? A Preliminary Analysis
116. PATRICK, SD — Performance Validity Assessment Using Response Time on the Warrington Recognition Memory Test
117. RAI, JK — Classification Accuracy of TOMM Trial 1 Cutoffs in a Large Medical-Legal Sample
118. RESCH, Z — Base Rates of Performance Validity Test Failure Among Electrical Injury Patients
119. RICHEY, LN — A Comparison of Performance Validity Measures in Predicting MMPI-2 Lie Scale Results
120. SHEIKH, K — Lowering the Dot Counting Test E-Score Cut-Off Misclassifies Credible Older Adults
121. SMOTHERMAN, J — BDAE Complex Ideational Material as an Indicator of Performance Validity in NFL BAP Neuropsychological Assessments
122. SORGE, L — Use of Eye Tracking During the Wisconsin Card Sorting Test as an Intrinsic Test of Effort
123. SUHR, J — The Relationship of Cogniphobia to Symptom Validity and Performance Validity in Neuropsychological Evaluations
124. TAYLOR, S — On the Cusp of Failure: Exploration of Borderline PVT Performance in a Chronic Pain Sample
125. VOGT, EM — Performance Validity Cut-Off Scores for the Automatized Sequences Task in a Mixed Clinical Pediatric Sample
126. WALLS, BD — Conners' Adult ADHD Rating Scales–Self-Report: Long Version Infrequency Index Validation and Pilot Comparison of Administration Formats

Other

127. GRANT, A — Symptom Validity Tests in College Students Feigning ADHD versus Depression and Anxiety

Assessment/Psychometrics/Methods (Adult)

128. GOVEROVER, Y — Measuring Changes in Activity Participation of Persons with Cognitive Impairments: Use of the Activity Card Sort Test
129. GOVEROVER, Y — Changes in Activity Participation Following Multiple Sclerosis and Traumatic Brain Injury

Aging

130. ROTENBERG, S — Older Adults with Subjective and/or Objective Cognitive Decline: Relationship with Participation in Daily Activities

Assessment/Psychometrics/Methods (Adult)

131. BAUM, MC — Measuring Changes in Activity Participation of Persons with Cognitive Impairments: Use of the Activity Card Sort Test

9:00–10:30 AM

Invited Symposium 1. Neurotechnology for Neuropsychology in Egypt, Nepal and Canada: Perspectives, Intersections and Opportunities

Chair: Judy Illes
Presenters: Tamer Emara, Alissa Antle, Claudia Barned
Broadway Ballroom North and Shubert Complex

1. ILLES, J — Neurotechnology for Neuropsychology in Egypt, Nepal and Canada: Perspectives, Intersections and Opportunities
2. EMARA, T — Teleneurology Courses Connecting African and Arab Countries: The Treat and Teach Initiative

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3.	ANTLE, A	Ethics, What Ethics? Developing a Wearable Brain-Computer App for Children Living in Poverty In Nepal and Canada
4.	BARNED, C	Addiction, Neurotechnology and Culture

9:00–10:30 AM **Paper Session 1. Aging & Sociodemographic Factors**
Moderator: Duke Han
West Side Ballroom Salon 3

1.	FARRELL, M	Gender Disparity in Educational Attainment Mostly Explains Cognitive Gender Differences in Older Rural South Africans
2.	KAMALYAN, L	Effect of Neighborhood Disadvantage Level on Cognitive Trajectory Among Diverse Older Adults
3.	CHEY, J	Social Network Properties and Neurocognitive Health in Later Life: Findings from the Korean Social Life, Health, and Aging Project (KSHAP)
4.	AVILA, JF	Interactions Between Sex/Gender and Race/Ethnicity on Cognitive Trajectories and Dementia
5.	BOOTS, EA	Racial Differences in Inflammation, Cognition, and Structural Connectomics: A Preliminary Study
6.	GAMMADA, EZ	Sex Differences in Serial Position Effects Inform the Paradoxical Verbal Memory Advantage of Women with MCI

9:00–10:30 AM **Symposium 1. Clinically and Empirically Informed Approaches to Functional Brain Mapping in Under-Represented Populations with Epilepsy: An Intradisciplinary Bio-Psycho-Social Model**
Chair: Heidi A. Bender
Presenters: Marla Hamberger, David Sabsevitz, Saadi Ghatan, Jessica Spat-Lemus
West Side Ballroom Salon 1

1.	BENDER, HA	Biopsychosocial Considerations in the Functional Brain Mapping of Epilepsy Patients: An Intradisciplinary Approach
2.	HAMBERGER, M	Considerations in Cortical Language Mapping in Epilepsy: A Review of Relevant Research
3.	SABSEVITZ, DS	Cognitive Mapping During Awake Brain Surgery: The Need for Informed and Technologically-Novel Mapping Methods
4.	GHATAN, S	Optimizing Intra-and Extra-Operative Brain Mapping Procedures in Collaboration With Neuropsychologists: A Neurosurgeon's Perspective
5.	SPAT-LEMUS, J	Mapping the Melting Pot: Approaches from Clinical Cross-Cultural Neuropsychology

9:00–10:30 AM **Symposium 2. Early Brain Injury and the Parent Experience: Unique Beginnings and Common Outcomes During the Early Years**
Chair and Presenter: Tricia Williams
Presenters: Ashley Danguecan, Rachel Peterson, Samantha Roberts
West Side Ballroom Salon 2

1.	WILLIAMS, T	Early Brain Injury and the Parent Experience: Unique Beginnings and Common Outcomes During the Early Years
2.	DANGUECAN, A	Congenital Heart Disease: The Impact of Parent Experience and Mental Health on Early Developmental Outcomes
3.	PETERSON, R	Parent Experiences and Developmental Outcomes following Neonatal Stroke: Areas of Optimism and Concern
4.	ROBERTS, S	Themes in Parent Experience and Outcomes of Children with Neonatal Hypoxic Ischemic Encephalopathy
5.	WILLIAMS, T	Intervention Experiences and Service Gaps following Early Brain Injury

9:00–10:30 AM **Symposium 3. Evolution of the Concept of Performance Validity: from Malingering to Illness Behavior in the Clinical Context**
Chair and Presenter: Jeroen Roor
Discussant: Roy P. Kessels
Presenters: Kyle Boone, Julie Suhr, Rudolf Ponds
West Side Ballroom Salon 4

1.	ROOR, J	Evolution of the Concept of Performance Validity: from Malingering to Illness Behavior in the Clinical Context
2.	BOONE, K	Impact of Somatoform Symptomatology on PVT performance
3.	SUHR, J	The Role of Cogniphobia in Symptom and Performance Validity in Neuropsychological Assessment
4.	ROOR, J	Feedback on Underperformance in Patients with Chronic Fatigue Syndrome: Relevant Patient Characteristics and Clinical Impact
5.	PONDS, R	The Residual Effect of Intentional Feigning on Symptom Reporting and Memory Performance

9:30–10:45 AM

Poster Session 3. Psychosocial, Psychiatric, & Substance Use
Broadway Ballroom South and Majestic Complex

Drug/Toxin-Related Disorders (including Alcoholism)

1. AASE, D — Social Cognition Performance in AUD and a NO-AUD Comparison Group: A Pilot Study
2. ARASTU, SF — Beyond the Bud: The Impact of Age-of-Onset and Motivation on Executive Functioning and Processing Speed in Cannabis Users
3. BIERNACKI, K — How Do You Feel?: Interoceptive Awareness and Decision-Making in Long-Term Opiate Users
4. CRAUN, EA — Neurocognitive Functioning Mediates the Relationship Between Alcohol Use and Frequency of Criminal Behavior in Jail Inmates
5. CRAUN, EA — Executive Functions Among Children of Alcoholics and Controls
6. DAHLGREN, MK — Travelling Down Life's Highway: Earlier Age of Marijuana Onset is Associated with Impaired Driving
7. GREIF, T — Impact of Executive Function and Cortisol Stress Responsivity on Substance Use Treatment Outcomes in Prison Inmates
8. HUSSAIN, MA — Loneliness Predicts Risky Sexual Beliefs and Intentions in Methamphetamine Dependent (MA+) Individuals
9. KANGISER, MM — Gender Moderates the Impact of Binge Drinking on Cognition in Young Adults
10. LIVINGSTON, E — Substance Use Profiles & Cognition in Marginally Housed & Homeless Individuals
11. MAHONEY, JJ — The Relationship between Cognition and Potential Moderating Factors in Individuals with Opioid Use Disorder
12. MAPLE, KE — Blunted Rostral Anterior Cingulate Activation During an Emotional Inhibition Task in Chronic Cannabis Users
13. MORGAN, BV — Individual Difference Factors Associated with High-Risk Substance Use in College Students
14. MULHAUSER, K — Executive Functions and Cortisol Stress Responses: A Path Analysis of Substance Use Disorder History on CBT Treatment Outcomes
15. OLSEN, P — The Role of Smoking on Neurocognitive Functioning in Persons with Opioid Use Disorder
16. REYNOLDS, B — Blackouts, hangovers, and lasting consequences: The role of executive function and trait impulsivity in substance use behavior
17. ROSEN, AS — Cannabis-User Eyewitnesses not so "Far Out": Lineup Identification Accuracy Similar Among Cannabis Users and Nonusers
18. SCOTT, TM — The Role of Neurocognitive Functioning, Cocaine Use, and Dose on Medication Adherence in Patients Receiving Opioid Agonist Treatment
19. THOMPSON, RC — Examiner Expectancies about Cannabis Use Negatively Affect Neurocognitive Performance in a Sample of Chronic Cannabis Users and Non-Users
20. VADHAN, NP — Changes in Risk-Taking and Punishment Sensitivity in Problem Alcohol Drinkers During Adaptive Psychological Treatment

Emotional and Social Processes

21. AHNE, EJ — The Effects of Language Exposure and Proficiency on Personality and Alexithymia in Spanish-English Bilinguals
22. BEAUDOIN, C — Abilities in Theory of Mind Space (ATOMS): A Conceptual Framework Derived From Measures of Theory of Mind for Preschoolers
23. BOROD, JC — The Intensity of Emotional Experience and Facial Expression in Individuals with Parkinson's Disease (PD) and Healthy Adults
24. BROUGHTON, TS — Heart and Brain Responses to Aggression: Studying Conforming and Non-Conforming Men
25. CASTOR, N — Relationship Between Emotional States and Resilience in Brain-Injured Patients
26. CLARK, U — Exposure to Racial Stereotypes about Alcohol and Substance Use Leads to Increased Impulsivity in African American Social Drinkers
27. COLL, S — Social Cognition Deficits in the Post-Traumatic Stress Disorder Following Paris Terrorist Attacks in November 2015
28. DAVIS, J — Is Pseudobulbar Affect Underdiagnosed among Rehabilitation Patients?
29. DORRIS, L — Human Cognitive Empathy Across the Lifespan
30. ESBIT, S — High Self-Perceived Adroitness: An Altered Perception of Reality During Sleep Deprivation
31. EVERHART, DE — The Sleep Approach Avoidance Task (SAAT): Self-Reported Insomnia is Associated with Approach Motivation for Implicitly Presented Disturbed Sleep-Related Images
32. FISHER, EL — The Impact of Communication Mismatch on Parent Ratings in Clinically Referred Children Who Are Deaf or Hard of Hearing
33. GALLAGHER, K — The Relationship Between Service-Related Conditions and Quality of Life in Female Military Veterans
34. KRYZA-LACOMBE, M — Executive Functioning and Neural Mechanisms of Reward Processing in Early Adolescence
35. LAFOLLETTE, K — Predicting Psychosocial Stress Reactivity from Ability and Trait-Based Emotional Intelligence
36. LAFOLLETTE, K — Stay Negative?: Positive Affect is Associated with Increased Psychosocial Stress Reactivity
37. LEBLANC, E — Prospective Association Between Attachment Disorganization in Infancy and Brain Morphometry in Late Childhood
38. SHARIFIAN, N — The Longitudinal Association between Social Network Composition and Episodic Memory in Older Adulthood: The Importance of Social Engagement with Friends
39. STONE, E — "Facial Affect Recognition Differences in Individuals with MS: A Pilot Study Using Eye-Tracking"
40. VANUK, JR — Ability-Based Emotional Intelligence is Associated with Greater Cardiac Vagal Tone

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80. ECKFELD, A — Neurocognitive and Social Cognitive Profiles of Early-Onset Psychosis and 22q11.2 Deletion Syndrome: Relationship to Functional Outcome
81. EGGER, J — Social Cognition and Perspective Taking in Psychosis: Assessing Deictic Relational Responding Using the IRAP
82. FERNANDEZ, VG — Linguistic and Neurocognitive Correlates of Probabilistic Classification Learning in Schizophrenia
83. LUPAS, G — Does Age Moderate the Relationship Between Neurocognition, Theory of Mind, Quality of Life, and Social Functioning in Schizophrenia?
84. MARZOUK, TD — Relationship Between Clozapine and Clozapine Metabolite Levels and Cognitive Function in Treatment-Resistant Schizophrenia: A Pilot Study
85. MATSUI, M — Pilot study of cognitive reserve in Japanese patients with schizophrenia using Cognitive Reserve Index questionnaire
86. NGUYEN, TT — Blood-based Biomarkers of Inflammation are Related to Processing Speed and Executive Function in Schizophrenia
87. OJEDA DEL POZO, N — White Matter Fractional Anisotropy Differences Between Psychiatric Patients with and Without Suicide Attempts and Their Relationship with Impulsivity
88. PATTEN, RV — Neuropsychological Predictors of Supported Employment Outcomes in People with Severe Mental Illness
89. PETERSSON, A — Psychosis as a Marker of Neurocognitive Decline in Marginally Housed Persons
90. RUIZ, I — A Meta-Analysis of Standardized Neuropsychological Effort Test Performance in Psychotic Disorders
91. TETI, A — Time-Based Prospective Memory Deficits in Adolescents at Clinical High Risk for Psychosis
92. VALTIERRA, GM — Schizotypy and Semantic Distance in Convergent Creative Thinking
93. WILLIAMS, C — Exploring the Relationship Between Cognitive Factors and Engagement in Shared Decision Making in People with Serious Mental Illness

10:30–10:45 AM — **AM Coffee Break**
Broadway Ballrooms South

10:45–11:45 AM — **Plenary B. Advances in Neurotechnology for Neurocognition: Balancing on the Tightrope of Discovery, Treatment, and Translation**
Presenter: Judy Illes
Broadway Ballroom North and Shubert Complex

1. ILLES, J — Advances in Neurotechnology for Neurocognition: Balancing on the Tightrope of Discovery, Treatment, and Translation

11:45 AM–1:15 PM — **Paper Session 2. Neurodevelopment & Neurodevelopmental Disorders**
Moderator: Robin L. Peterson
Broadway Ballroom North and Shubert Complex

1. SCOTT, J — Cannabis Use in Youth is Associated with Limited Alterations in Brain Structure
2. PAN, J — Language Contributions to Executive Functioning in Typical Neurodevelopment
3. LIPSHATZ ESHWEGE, S — Relations of Inhibition Control and Emotion Recognition to Peer Interaction in Children with ADHD
4. SCHIAVONE, N — Subthreshold ADHD Symptoms in Childhood and Neuropsychological Functioning in Adulthood in a Perinatal Risk Cohort
5. SADIKOVA, E — Diagnostic Clarification of Youth with Co-Occurring Apparent Autism Spectrum Disorder and Gender Dysphoria
6. HAMNER, T — Aberrant cortical thickness and surface area characterization in Down syndrome: Contrasting findings from chronological and mental-age matched peers

11:45 AM–1:15 PM — **Paper Session 3. Dementia**
Moderator: Ozioma Okonkwo
West Side Ballroom Salon 2

1. VONK, J — Semantic Network Function Captured by Word Frequency in Nondemented APOE ε4 Carriers
2. WILSON, KN — A Novel, Brief Intervention Reduces Stress in Caregivers of Individuals with Dementia
3. KREMEN, WS — Cognition Predicts Progression to Amyloid Positivity in Amyloid-Negative Individuals
4. NATION, DA — New Method for Identifying Neuropsychological Decline Predicts Progression to Dementia Beyond Alzheimer's Biomarkers in Asymptomatic Elderly
5. YEUNG, L — Cerebrospinal Fluid Levels of Amyloid and Tau Are Independently Associated with Delayed Retention Memory in Non-Clinical Older Adults
6. FLORES VELASCO, RJ — Early Life Socio-Economic Status as a Predictor of Incident Dementia and Mortality in Late-Life

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11:45 AM–1:15 PM **Paper Session 4. Schizophrenia**
Moderator: Jimmy Choi
West Side Ballroom Salon 3

1. CHOI, J — Pupillometry-based Neurofeedback Cognitive Training for Teenagers at Clinical High Risk for Psychosis
2. CLARK, SV — Reduced Cerebello-Cortical Resting-State Functional Connectivity in Schizophrenia and its Relationship to Performance on the MATRICS Consensus Cognitive Battery
3. SILVERSTEIN, S — Retinal Anomalies in Schizophrenia and Their Clinical and Functional Significance
4. GREEN, M — Early Auditory Processing in Schizophrenia: Relationships to Clinical Symptoms and Cognitive Remediation
5. JAVITT, D — Early Sensory Processing Deficits in Schizophrenia: Distribution and Consequences
6. MEDALIA, A — Impact of Baseline Early Auditory Processing on Response to Cognitive Remediation for Schizophrenia

11:45 AM–1:15 PM **Symposium 4. Lesser Known Aspects and Unresolved Controversies Regarding Wernicke-Korsakoff Syndrome**
Chair: Stephen C. Bowden
Presenters: Nicolaas Arts, Rosemary Fama, Roy P. Kessels, Simon J. Scalzo
West Side Ballroom Salon 1

1. BOWDEN, S — Lesser Known Aspects and Unresolved Controversies Regarding Wernicke-Korsakoff Syndrome
2. ARTS, N — Korsakoff's Syndrome: What We Still Don't Know
3. FAMA, R — Heterogeneity of Executive Function and Memory Performance Among Chronic Alcoholics Meeting Either the Dietary Deficiency or Ataxia Criterion in the Assessment of Preclinical Wernicke's Encephalopathy
4. KESSELS, RP — Preserved Intelligence in Korsakoff's Syndrome? A Neuropsychological Perspective on Crystallized Intelligence, Fluid Reasoning and Executive Function
5. SCALZO, SJ — Psychometric Heterogeneity of the Chronic Korsakoff Phase With or Without Alcohol: A Case-Series and Systematic Review

11:45 AM–1:15 PM **Symposium 5. Impact of Physical Exercise on Cognition Across the Life-Span**
Chair and Presenter: David Predovan
Presenters: Jennifer Heisz, Laura Middleton, Louis Bherer, John Best
West Side Ballroom Salon 4

1. PREDOVAN, D — Impact of Physical Exercise on Cognition Across the Life-Span
2. PREDOVAN, D — Effect of Physical Exercise on Cognition in Healthy Adults Aged 20-67
3. HEISZ, J — The Effects of a Combined Physical Exercise and Cognitive Training on Memory, Brain-Derived Neurotrophic Factor and Insulin-Like Growth Factor 1
4. MIDDLETON, L — Changes in Cognition and Mood Across Repeated Exercise Sessions
5. BHERER, L — Cardiorespiratory Fitness Differently Mediates Physical Training Related Improvement in Dual-Task Performances in Younger-Old and Older-Old Adults
6. BEST, J — Aerobic Exercise Promotes Cognitive and Neural Outcomes in Adults With Mild Vascular Cognitive Impairment

12:00–1:15 PM **Poster Session 4. Adult Medical**
Broadway Ballroom South and Majestic Complex

Anoxia/Hypoxia

1. RASKIN, S — Neuropsychological functioning in women survivors of domestic violence
2. STABLER, A — Neuropsychological Impairment from Anoxic Injury in the Setting of Perioperative Cardiac Arrest due to Hypovolemic Shock: A Case Study

Concussion/Mild TBI (Adult)

3. MARTIN, BJ — Neuropsychological Presentation of PTSD and Blast-Induced mTBI among Iraq and Afghanistan Veterans

Infectious Disease/Encephalitis/Meningitis (including HIV/AIDS)

4. ALVAREZ, K — Lifetime and recent alcohol use is associated with learning, memory, and working memory performance in HIV+ individuals
5. CROOK, CL — The Effects of Current and Past Cannabis Use on Cognitive Functioning in PLWH
6. HICKSON, R — Neurocognition and Antiretroviral Therapy Adherence Among South Africans Living with HIV
7. IUDICELLO, JE — Plasma vascular cellular adhesion molecule-1 (VCAM-1) levels are elevated in HIV disease and methamphetamine dependence and associated with neurocognitive impairment
8. KABUBA, N — Adult neuropsychological testing in Zambia's HIV positive population on combined antiretroviral therapy
9. KUNDU, R — Synergistic Effects of High Early-Life Stress Exposure and HIV Infection on Reaction Time Intra-Individual Variability

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Medical/Neurological Disorders/Other (Adult)

Movement and Movement Disorders

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Multiple Sclerosis/ALS/Demyelinating Disorders

https://doi.org/10.1017/S1355617719000663 Published online by Cambridge University Press

97. LENGENFELDER, J — Emotional Awareness in Individuals with Multiple Sclerosis
98. MAYO, C — Fatigue in Multiple Sclerosis: Relationship with Mood and Cognition
99. MULLIGAN, R — Polypharmacy and Neuropsychological Function in Multiple Sclerosis
100. NAVARRO, GY — The effects of added interventions in a cognitive- based rehabilitation in persons with M.S
101. PASTERNAK, E — Exploring the relationship between cognitive reserve and cognitive fatigue in multiple sclerosis: a cross sectional retrospective study
102. PORTNOY, J — Errors on the Symbol Digit Modalities Test and Performance Validity in Multiple Sclerosis
103. RAPHAIL, A — The Impact of Cognitive and Motor Functioning as Driving Demands Increase in Individuals with Multiple Sclerosis

Movement and Movement Disorders

104. SACCÀ, F — Normalization of Timed Neuropsychological Tests with the PATA Rate and Nine-Hole Pegboard Tests in Parkinson's Disease and Multiple System Atrophy

Multiple Sclerosis/ALS/Demyelinating Disorders

105. SACCÀ, F — The impact of cognitive testing on disability measurement during the follow-up of people with Multiple Sclerosis
106. SPADONI, G — Amyotrophic Lateral Sclerosis (ALS) and Primary Lateral Sclerosis (PLS): the differences in cognitive functioning and in emotional recognition Giulia Spadoni[2], Maria Luisa Presenti[2], Marco Timpano and Stefania Tocchini[12 1] Public Health Authority ASL Nordovest della Toscana [2] University of Pisa
107. STIMMEL, M — Feasibility of an Intervention to Address Loss of Employment for Women with Multiple Sclerosis
108. STIMMEL, M — Use of In-Person Feedback and Care-Coordinator to Increase Adherence to Neuropsychological Recommendations in Women with Multiple Sclerosis
109. STROBER, L — Normative Data of the Oral Symbol Digit Modalities Test: An Update
110. WILLIAMS, R — Employment Status and Vocational Multitasking Performance in MS

Stroke/Cerebrovascular Injury & Disease (Adult)

111. TORRO-ALVES, N — Post-stroke brain asymmetry in the recognition and discrimination of dynamic facial expressions

Neurostimulation/Neuromodulation

112. TORRO-ALVES, N — Effects of transcranial direct current stimulation on frontal alpha2 oscillations in women with fibromyalgia

Other

113. LAFO, JA — Cognitive Characteristics of Investigator- vs. Self-Withdrawn Participants in a Study of Advanced Upper Limb Prosthetic Device Use
114. QUINN, CG — Predicting verbal and non-verbal learning in Parkinson's disease
115. VINGERHOETS, G — Mirrored Organs, Mirrored Brains? Brain Organization in Human Situs Inversus Totalis

Stroke/Cerebrovascular Injury & Disease (Adult)

116. ARADER, L — Relationship Between Subtypes of Post-Stroke Depression and Neuropsychological Profiles in Older Adults
117. BAUGHMAN, BC — Neuropsychological Function in Survivors of Aneurysmal Subarachnoid Hemorrhage
118. BAYER, C — The Development of and Clinical Utility of a Neuropsychological (NP) Stroke Protocol and Interventions for Patients in an Inpatient Acquired Brain Injury (ABI) Rehabilitation Setting
119. BONO, AD — An Efficient Battery to Assess Readiness for Driving after Stroke
120. DIAMOND, BJ — Discriminating Confabulations from Truths in Anterior Communicating Artery (ACoA) Aneurysm Using Autonomic Indices
121. DULAY, M — Longitudinal study of prediction of return-to-work after stroke
122. DUX, M — Persistent Cognitive Dysfunction in Veterans with Asymptomatic Carotid Stenosis and Impaired Cerebrovascular Hemodynamic Function
123. GOTRA, M — Neurocognitive Dysfunction after Revascularization in Post-Stroke Moyamoya Disease
124. GULHAR, R — Case Report: Migraine or Stroke?
125. HUENGES WAJER, I — The Relationship Between Cerebral Ischemia and Cognitive Outcome after Aneurysmal Subarachnoid Hemorrhage
126. LERITZ, E — Multimodal Default Mode Network Disruption in Metabolic Syndrome is Associated with Reduced Verbal Memory
127. MOORE, MJ — Object-Centred Neglect Associated with Worse Long Term Outcomes than Egocentric Neglect
128. PERAZA, J — Comprehensive Neuropsychological Assessment of Comorbid Superficial Siderosis and Seizures: A Case Report
129. SCHAEFER, LA — Discharge Destination in a Geriatric Stroke Rehabilitation Population: Role of Cognitive, Functional, and Social Factors
130. STERN, S — Neurocognitive Profile of a Clinical Sample of Adults with Moyamoya Disease
131. TWAITE, JT — Addenbrooke's Cognitive Examination – Revised (ACE-R): Performance in an Inpatient Acute Stroke Population

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TBI (Moderate-Severe; Adult)

132. VAKIL, E — The Effects of Moderate-to-Severe Traumatic Brain Injury on Episodic Memory: A Meta-Analysis

1:15–2:15 PM — **Lunch (On Own)**
Conference-Wide

2:15–3:45 PM — **Paper Session 5. HIV**
Moderator: Monica G. Rivera Mindt
West Side Ballroom Salon 1

1. SALONER, R — COMT Val158Met Polymorphism, Cardiometabolic Risk, and HIV-associated Neurocognitive Disorder
2. SALONER, R — Neurocognitive SuperAging in Older Adults Living with HIV: Demographic, Neuromedical and Everyday Functioning Correlates
3. BROWN, GG — Varieties of Reinforcement Learning Styles in HIV Infection and Methamphetamine Dependence: A Computational Modeling Study
4. WATSON, C — Cannabis Exposure is Associated with Less Neurocognitive Impairment in Older HIV+ and HIV- Adults
5. CAMPBELL, LM — Use of neuroimaging to inform optimal neurocognitive criteria for detecting HIV-associated brain abnormalities

2:15–3:45 PM — **Paper Session 6. Neuroimaging**
Moderator: Derin Cobia
West Side Ballroom Salon 3

1. SHAKED, D — Disparities in Diffuse Cortical White Matter Integrity Between Socioeconomic Groups
2. LAO, P — The relationship between cerebrovascular and Alzheimer's neuroimaging biomarkers and cognition in middle-aged Hispanics from a cohort study in Northern Manhattan
3. LAING, K — White Matter Hyperintensities are Associated with Increased Plasma Tau Levels in Individuals with Alzheimer's Disease
4. COLÓN, JM — Incidental Findings on MRI Scans in an Older Adult Multi-Ethnic Community-Based Cohort
5. STAFFARONI, AM — Perfusion Imaging using Arterial Spin Labeling Predicts Future Increases in White Matter Hyperintensities and is Associated with Processing Speed Declines in Functionally-Intact Older Adults
6. OBERLIN, LE — Inflammation and Preclinical AD: Associations Between Peripheral Inflammatory Biomarkers, Cognition, and Amyloid-β Deposition in Non-Demented Older Adults

2:15–3:45 PM — **Paper Session 7. Sport-Related Concussion**
Moderator: David Baker
West Side Ballroom Salon 4

1. TERRY, DP — Sleep Insufficiency and Symptom Reporting in Youth Athletes
2. WILMOTH, K — Postconcussive Anxiety, Depression, and Sleep Quality as Predictors of Prolonged Recovery in Adolescent Student Athletes
3. RIEGLER, KE — Differences in Neuropsychological Test Performance between Depressed and Non-Depressed Collegiate Athletes Following Injury
4. GUTY, E — Affective Bias and Depression in Collegiate Athletes Post-Concussion
5. CAZE, T — Anxiety Sensitivity's Relationship to Symptom Recovery after Sports-Related Concussion
6. GREENBERG, L — Personality Factors in Sports Concussion

2:15–3:45 PM — **Symposium 6. Integrating Personality, Cognition, and Brain Imaging**
Chair and Presenter: Sharon Sanz Simon
Discussant: Colin DeYoung
Presenters: Melissa C. Sweeney, Angeliki Tsapanou, Silvia Chapman, Victoria M. Leavitt
Broadway Ballroom North and Shubert Complex

1. SANZ SIMON, S — Integrating Personality, Cognition and Brain Imaging
2. SANZ SIMON, S — Personality-Cognition Relations across the Lifespan: the Role of Gender
3. SWEENEY, MC — Regional Cortical Thickness and Neuroticism Across the Lifespan
4. TSAPANOU, A — Default-mode Network and Neuroticism in Older Adults. Prediction of cognition
5. CHAPMAN, S — The Effects of Personality on Self-awareness
6. LEAVITT, VM — Neuroticism is Related to Nonverbal Memory Function in Persons with Multiple Sclerosis

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2:15–3:45 PM

Symposium 7. MABEL – Multi-language Assessment Battery of Early Literacy: Approaches to Literacy Testing Across Languages
Chair and Presenter: Markéta Caravolas
Presenters: Markéta Caravolas, Marina Mikulajova, Silvia Defior
West Side Ballroom Salon 2

1.	CARAVOLAS, M	MABEL – Multi-language Assessment Battery of Early Literacy: Approaches to Literacy Testing Across Languages
2.	SEIDLOVA MALKOVA, G	Reading Tasks in MABEL
3.	MIKULAJOVA, M	Phoneme Awareness Tasks in MABEL
4.	DEFIOR, S	RAN and Letter Knowledge Tasks in MABEL
5.	CARAVOLAS, M	The MABEL Battery -Discussion of the Benefits and Limitations of Directly Comparable Measures of Literacy
6.	CARAVOLAS, M	MABEL – Multi-language Assessment Battery of Early Literacy – Introduction and Background

2:30–3:45 PM

Poster Session 5. Pediatric Medical & Neurodevelopmental
Broadway Ballroom South and Majestic Complex

ADHD/Attentional Functions

1.	ALLEN, KR	Expressive Intelligence as an Indicator of IQ: Correlation and Prediction of EOWPVT-4 Scores and WISC-V FSIQ Scores of Children Diagnosed with Attention Deficit Hyperactivity Disorder
2.	BEDIR, B	Discriminant Validity and Clinical Utility of the Comprehensive Executive Function Inventory (CEFI) in the Assessment of Childhood ADHD
3.	BYLSMA, FW	With the CPT3 for ADHD Does the CATA Matter?
4.	CHAUDHARI, A	Neurostimulation for ADHD: Insights from the Past 10 Years
5.	COSTIN, C	ADHD: Yes, No, Maybe So
6.	FERGUSON, BJ	The Effects of Methylphenidate on Verbal Creativity and Problem-Solving Abilities in Individuals with Attention Deficit Hyperactivity Disorder
7.	GRANT, A	Performance Validity Tests in College Students Feigning ADHD versus Depression and Anxiety
8.	HAAK, CL	Neuropsychologists' Beliefs Regarding Assessing and Diagnosing Attention-Deficit/Hyperactivity Disorder (ADHD)
9.	HAISLEY, LD	Attention in Very Young Children with Neurological Injury Versus Typically Developing Peers
10.	HARRELL, MN	The Mediating Effects of Dysfunctional Personality Traits on Need for Cognition and ADHD Symptomology
11.	HINOJOSA, R	ADHD and Set Shifting: A Meta-Analysis Investigating Performance Differences on the Trailmaking Test
12.	HOLCOMBE, JS	Surviving High School with ADHD and EFD: A Mixed Methods Study Exploring How Students and Parents Perceive Attention Deficit Hyperactivity Disorder and Executive Functioning DeficitsImpact Academic and Daily Life
13.	HYDE, C	Reduced fine motor competence in children with ADHD is associated with atypical microstructural organization within the superior longitudinal fasciculus
14.	IRWIN, LN	Working Memory and Information Processing in Attention-Deficit/Hyperactivity Disorder
15.	LONDEN, E	Self-Reported Depression Negatively Impacts Sustained Attention in Adults
16.	MARRA, DE	Psychometric Investigation of the Barkley Deficits in Executive Functioning Scale-Short Form (BDEFS-SF)
17.	MICHALEK, AM	Exploring Pupillometry as a Measure of Attention during Audiovisual Speech Processing for Adults with ADHD
18.	ROSCH, KS	ADHD-Related Sex Differences in Frontal and Subcortical White Matter Microstructure and Associations with Delay Discounting
19.	SCHUSTER, RM	Dissociative Relationship Between ADHD Subtypes and Neurocognitive, Academic, Emotional and Adaptive Functioning: Preliminary Analyses from the Adolescent Brain Cognitive Development (ABCD) Study
20.	SHEEHAN, JC	Simple vs. Complex Motor Task Performance in Children With ADHD
21.	VAILLANCOURT, AA	Attention Functioning in Adolescents with a History of Childhood Prostitution
22.	VELEZ, AE	Attentional impairment patterns in patients with non-alcoholic Hepatic Cirrhosis
23.	VITALE, G	Regional Cerebral Blood Flow Patterns in Children vs. Adults with ADHD Combined and Inattentive Types: A SPECT Study

Autism Spectrum Disorders/Intellectual Disability

24.	ALABI, TO	Resolution of Autism Spectrum Disorder Following Hematopoietic Stem Cell Transplantation for Diamond-Blackfan Anemia
25.	ALEXANDER, AO	School Based Mindfulness and Changes in Everyday Executive Functioning Skills of Students with Autism Spectrum Disorder
26.	ARMOUR, A	Executive Function Profiles in Children with Autism Spectrum Disorder and/or Intellectual Disability
27.	BASKETT, V	An Eye-Tracking Study of Social Attention in Autism Spectrum Disorder and Phelan-McDermid Syndrome
28.	BECK, J	Do Executive Functioning Skills Allow Autistic Women to Camouflage Autistic Traits?
29.	BOCOBO, G	Maternal Hormone Profile and Autism Risk
30.	CLAWSON, A	Executive Functioning in Autism and Attention Deficit/Hyperactivity Disorder: Comorbidity Matters

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72. MACDONALD, KT — The Roles of Behavioral vs. Cognitive Attention in Reading among Struggling Readers
73. O'CONNOR DERIKOZIS, E — The Association of Phonological Awareness as Measured by the CTOPP-2 to Reading Performance
74. SPADONI, G — Learning Disabilities and Emotional Recognition: There is a Relation?
75. SYLVIA, A — Test Anxiety, Fluid Reasoning, and Reading Comprehension Among Adults Referred for Learning Difficulties
76. WESTERS, IA — The Relation Between Habituation, Intelligence and Working Memory in Normal Functioning Adults
77. WINTER, R — Modeling the Relation Between Working Memory and Reading Intervention Outcomes in Struggling Readers

Medical/Neurological Disorders/Other (Child)

78. ALEKSONIS, HA — Associations among Subcortical Brain Volumes and Adaptive Functioning in Long-Term Survivors of Childhood Brain Tumors
79. ALVAREZ, G — Medication Management and Functional Recovery in Anti-NMDA Receptor (Anti-NMDAR) Encephalitis
80. BADALY, D — Cerebellar and Prefrontal Structures Associated with Executive Functioning in Children and Adolescents with Congenital Heart Defects
81. BIEKMAN, B — Prefrontal cortex thickness and SES as predictors of executive functions in children with spina bifida myelomeningocele
82. CHANG, J — The Neuropsychological Functioning of Children and Adolescents with Anorexia Nervosa
83. COULEHAN, K — Neuropsychological Functioning and Hemispheric Disconnection Symptoms in a Child with Agenesis of the Corpus Callosum
84. ENGELMANN, M — Early Cognitive Recovery in a Pediatric Case of Familial Acute Necrotizing Encephalitis
85. FASANO-MCCARRON, ME — Performance on the ROCF at 8 Years Predicts Academic Achievement at 16 Years in Individuals with Critical Congenital Heart Disease
86. FAY-MCCLYMONT, TB — Neuropsychological and Quality of Life Outcomes in a Cohort of Children with Sickle Cell Disease Undergoing Matched Sibling Donor Hematopoietic Cell Transplant
87. FOX, ME — The Neurological Predictor Scale as a Predictor of Poorer Adaptive Functioning via Executive Dysfunction
88. GRIFFIN, D — Clinic-Based Neuropsychological Screening in Children with Neurofibromatosis Type 1
89. HALVERSON, K — Neurocognitive and Mathematical Profiles of Spina Bifida Myelomeningocele and Math Disability
90. HARCIAREK, M — Leftward Attentional Bias in Dialyzed Patients with End-Stage Renal Disease: A Sign of Increased Right Parietal Activation or a Problem with Left-Sided Disengagement?
91. JAY, MF — Association of Emotional and Behavioral Symptoms with Cognitive and Adaptive Functioning in Children with Intractable Epilepsy
92. KAIS, LA — Use of EEG and Behavioral Measures for Early Detection of Childhood-Onset Cerebral Adrenoleukodystrophy: A Feasibility Study
93. KAUTIAINEN, RJ — Corpus Callosum White Matter Integrity Associated with Adaptive Functioning Outcomes of Long-Term Survivors of Pediatric Brain Tumors
94. KIRSCH, AC — Patterns of Neuropsychological Functioning Across Craniofacial Abnormalities
95. LEE, K — Longitudinal Examination of Problem Behaviors in Children with Neurofibromatosis type 1
96. OHNEMUS, DM — A Pilot Study of Potential Screening Tools for Pediatric Minimal Hepatic Encephalopathy
97. OSTOJIC, D — Parent Reported Behavioral Concerns in a Sample of Pediatric Patients with Moyamoya Vasculopathy
98. REIFE, I — The Effect of Oxygen Saturation on Executive Functioning in Children with Sickle Cell Disease
99. SCHNEIDER, HL — Neurocognitive and Educational Outcomes in Children with Multiphasic Opsoclonus-Myoclonus-Ataxia Syndrome (OMS)
100. SEMMEL, E — Executive Functioning Partially Explains the Relationship Between Brain Network Characteristics and Adaptive Functioning in Pediatric Brain Tumor Survivors
101. THOMPSON, J — Behavioral, Emotional, and Social Outcome in Individuals with Childhood Extracorporeal Membrane Oxygenation: A Case Series
102. TIPLADY, K — Inattentive Symptoms Predict Autism Characteristics in Children with Neurofibromatosis Type 1
103. VARGO, T — Model for Newborn Screening: Short-Term Treatment Outcomes for Children Identified with Hurler Syndrome at Birth
104. WESONGA, E — Executive Abilities and Academic Achievement in Children with Sickle Cell Disease
105. WOLFE, KR — Oxygen Saturations and Neurodevelopmental Outcomes in Single Ventricle Congenital Heart Disease: A Secondary Database Analysis of Pediatric Heart Network Trials
106. YUND, B — The Impact of Sleep Problems on Executive Functioning in School-Aged Children with NF1

Multiple Sclerosis/ALS/Demyelinating Disorders

107. HAGUE, C — Comparing Quality of Life in Pediatric Anti-NMDA Receptor Encephalitis and Acute Disseminated Encephalomyelitis (ADEM)

Neurostimulation/Neuromodulation

108. STRUTT, A — Cognition and Psychological Symptomology in Tourette's Syndrome following Deep Brain Stimulation

Other

109. GOLDSTEIN, S — Maternal Anxiety and Sleep Predict Greater Concern About Infant Sleep at Newborn and Two Months
110. LEONARD, S — School Functioning and Cognitive Outcomes for Youth Involved with Child Welfare Services

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Prematurity/Low Birth Weight/In Utero Teratogen Exposure

111. BLACKWELL, MC	Neuropsychological Assessment in Complex Congenital Neurological Disorders: A Case Study of Myelomeningocele
112. HASLER, HG	Growth of Formal and Informal Mathematics Skills in Children Born Very Preterm
113. INKELIS, SM	Age-Related Differences in Measures of Attention and Sluggish Cognitive Tempo in Children with Histories of Prenatal Alcohol Exposure
114. LIND, A	Functional Magnetic Resonance Imaging During Visual Perception Task in Prematurely Born Adolescents
115. MCCALL, DM	Hippocampal Volumetry and Episodic Memory in Preterm-Born Children
116. PRITCHETT, A	The Association between Prenatal Cannabis Exposure and Higher Expression of MAO-A Gene in Girls
117. RAZ, S	Twin Gestation, Perinatal Risk, and Neuropsychological Functioning of Preschool-Age Children Born Prematurely
118. RAZ, S	Preschool Measures of Executive Functioning and Language Development in Children Born Prematurely
119. RIEGER, R	The Impact of Premature Birth, Gender, and Socioeconomic Status on Frontotemporal Gray Matter and Vocabulary Development
120. SADURNÍ GARCÍA, CB	Differences in the Neuropsychological Profile of Three Biological Sisters With a History of Intra-Uterine Exposure to Drugs Adopted at Different Ages: A Case Study

Stroke/Cerebrovascular Injury & Disease (Child)

121. AILION, A	Neural Plasticity of Language Following Pediatric Stroke
122. DEOTTO, A	Mental Health Following Pediatric Stroke: The Role of the Environment and Personal Experience
123. DUDA, TA	Primary Central Nervous System Vasculitis – An Interdisciplinary Case Study
124. LOBLEIN, HJ	A Case of Phonological Alexia Following Pediatric AVM Rupture
125. PETERSON, R	Characterizing Language Outcome Following Childhood Basal Ganglia Stroke
126. WEGFAHRT, M	The Role of Neuropsychological Assessment in Intrauterine Infract

Genetics/Genetic Disorders

127. SCHWARTZ, DD	Cognitive and Adaptive Functioning in Children and Adults with Robinow Syndrome

3:45–4:00 PM **PM Coffee Break**
Broadway Ballrooms South

4:00–5:00 PM **Debate: Going to Pot? Clearing Away the Smoke on Brain, Behavior, and Cannabis**
Moderator: Raul Gonzalez
Presenters: Igor Grant, Krista Lisdahl
Broadway Ballroom North and Shubert Complex

4:00–5:30 PM **Paper Session 8. Validity Testing**
Moderator: Elise K. Hodges
West Side Ballroom Salon 2

1.	DHILLON, S	The Assessment and Detection of Feigned Symptoms following mTBI: Performance and Symptom Validity Test Diagnostic Efficiency and Implications
2.	BABIKIAN, T	Standard Intelligence Tests as Measures of Effort and Malingering in the US
3.	ARANGO-LASPRILLA, JC	The Test of Memory Malingering among Latin American Spanish-Speaking Adults: A Cross-Cultural Analysis
4.	AYEARST, LE	Test Fairness and the Revision of the Test of Memory Malingering (TOMM)
5.	BOONE, K	Impact of Language Status (English as a second language and non-English-speaking) on Performance Validity Tests
6.	TRUTER, S	Cut-off Scores on Four Effort Tests for Educationally Disadvantaged South African Adults

4:00–5:30 PM **Paper Session 9. Bilingual & Cross-Cultural**
Moderator: Alberto L. Fernandez
West Side Ballroom Salon 3

1.	VELEZ-URIBE, I	The Influence of Proficiency on Emotion Word Processing in Spanish-English Bilinguals: An ERP Study
2.	DIAZ, MM	Do cognition and education protect against the "Immigration Health Paradox"?
3.	ARCE RENTERÍA, M	The Role of Bilingualism on Age-Related Structural Differences and Cognition
4.	LEON, A	Associations of Spanish-English Bilingualism and Sex Differences in Cognitive Performance in the Hispanic Community Health Study/Study of Latinos

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5.	SHAFER, VL	Limited Input, Positive Transfer and Environmental Factors: Behavioral and Neurophysiological Effects on Receptive Language in Bilingual Preschoolers
6.	SMIRNOV, DS	Differing Effects of Bilingualism and Education on Brain Structure in Alzheimer's Disease (AD)

4:00–5:30 PM **Paper Session 10. Stroke / Cerebrovascular**
Moderator: Andrew Colvin
West Side Ballroom Salon 4

1.	CHESEBRO, A	Nocturnal Blood Pressure Dipping and Hypertension Are Associated with White Matter Hyperintensities and Cognition
2.	DULAY, M	Biopsychosocial predictors of depression after stroke
3.	DEMEYERE, N	Post-Stroke Cognitive Trajectories and the Impact of Executive Switching Impairments on Overall Participation Outcomes
4.	RUIZ, LD	Socioeconomically Disadvantaged Neighborhoods, Stroke Risk, and Cognition in Older Adults: A focus on Violent Crime
5.	STAMM, BC	Parental History of Dementia is Associated with Increased Cerebrovascular Disease
6.	WERHANE, M	Arterial Stiffening Moderates The Relationship Between Diabetes And White Matter Lesion Burden In Older Adults With Mild Cognitive Impairment

4:00–5:30 PM **Symposium 8. What can Studying Down Syndrome Teach us About Alzheimer's Disease?**
Chair and Presenter: Adam M. Brickman
Presenters: Nicole Schupf, Patrick Lao, Benjamin Handen
West Side Ballroom Salon 1

1.	BRICKMAN, AM	What can studying Down syndrome teach us about Alzheimer's disease?
2.	SCHUPF, N	Proteomic profiles of risk for incident mild cognitive impairment and Alzheimer's disease among adults with Down syndrome
3.	LAO, P	Image-based biomarkers of Alzheimer's-like pathophysiology in adults with Down syndrome without dementia
4.	BRICKMAN, AM	Examining Alzheimer's-related cerebrovascular disease in Down syndrome
5.	HANDEN, B	Cognitive correlates of amyloid PET in Down syndrome

5:30–6:30 PM **Plenary C. Generation of New Hippocampal Neurons in the Adult Brain: Implications for Mental Health**
Presenter: Sandrine Thuret
Broadway Ballroom North and Shubert Complex

1.	THURET, S	Generation of New Hippocampal Neurons in the Adult Brain: Implications for Mental Health

FRIDAY, FEBRUARY 22, 2019

7:20–8:50 AM **CE Workshop 9. The Wellbeing of Caregivers of People with Dementia Considered from a Neuropsychological Perspective**
Presenter: Robin G. Morris
West Side Ballroom Salon 2

1.	MORRIS, RG	The Wellbeing of Caregivers of People with Dementia Considered from a Neuropsychological Perspective

7:20–8:50 AM **CE Workshop 10. Air Pollution and the Adult Brain: Impact on Cognition, Dementia, and Mood**
Presenter: Melinda C. Power
West Side Ballroom Salon 4

1.	POWER, MC	Air Pollution and the Adult Brain: Impact on Cognition, Dementia, and Mood

8:00–9:00 AM **Early Career Award Presentation: Neural Correlates of Learning and Outcome Processing in Multiple Sclerosis and Traumatic Brain Injury**
Award Recipient: Ekaterina Dobryakova
Broadway Ballroom North and Shubert Complex

1.	DOBRYAKOVA, E	Neural Correlates of Learning and Outcome Processing in Multiple Sclerosis and Traumatic Brain Injury

9:00–10:00 AM **Plenary D. Individual Pathways of Resilience to Alzheimer's Disease: Embracing Complexity**
Presenter: Timothy J. Hohman
Broadway Ballroom North and Shubert Complex

1. HOHMAN, TJ — Individual Pathways of Resilience to Alzheimer's Disease: Embracing Complexity

10:00–10:15 AM **AM Coffee Break Sponsored by Kessler Foundation**
Broadway Ballrooms South

10:15–11:30 AM **Poster Session 6. Cancer, Epilepsy, & Genetic Disorders Across the Lifespan**
Broadway Ballroom South and Majestic Complex

Cancer

1. BAREFOOT, C — A Meta-Analysis of Psychological and Cognitive Outcomes Following Chemotherapy
2. BARLOW-KRELINA, E — Physical activity and neurocognitive outcomes in adult survivors of childhood cancers: A report from the Childhood Cancer Survivor Study (CCSS)
3. BUTTERBROD, E — Predicting Disease Progression in Newly Diagnosed High-Grade Glioma with Cognitive Parameters: The Value of Longitudinal Patient-Specific Neuropsychological Assessment
4. CLARK, BE — Financial Difficulties Predict Subjective Cognitive Impairment After Chemotherapy
5. CONKLIN, HM — Cognitive Gains following Computerized Cognitive Training Fail to Generalize to Improved Social Skills among Childhood Cancer Survivors
6. EASTMAN, JA — History of Remote Cancer Diagnosis and Neuroanatomical Correlates in Older Adults: The Link Between Cancer- Related Cognitive Impairment and Preclinical Alzheimer's Dementia
7. EASTMAN, JA — History of Cancer Diagnosis and Cognitive Function in Older Adults: Examining Cancer-Related Cognitive Impairment and Preclinical Alzheimer's Dementia
8. EVANS, CL — Expressive and Receptive Language Functioning Following Proton Radiation Therapy for Pediatric Brain Tumor
9. HARTZELL, JW — Cancer Patients' Subjective Cognitive Distress and Utilization of Neuropsychological Services
10. HEITZER, A — Neuropsychological Outcomes of Patients with Low-Grade Glioma Brain Tumors Diagnosed During the First Year of Life
11. HENNEGHAN, AM — Amyloid Beta and Cognitive Performance of Breast Cancer Survivors
12. JACOLA, L — Predicting the Need for Educational Services in Survivors of Childhood Acute Lymphoblastic Leukemia (ALL): The Role of On-Therapy Serial Neurocognitive Monitoring
13. KENNEDY, EE — Long-Term Memory Outcomes in Children with Craniopharyngioma following Transsphenoidal Resection
14. LUU, H — Impact of Cognitive and Emotional Functioning on Quality of Life in Brain Tumor Patients
15. MCCURDY, MD — Clinician-Generated Metric of Treatment Intensity Predicts Processing Speed in Long-Term Survivors of Childhood Brain Tumors
16. NA, S — Altered White Matter Topology Underlies Executive Functioning Deficits in Adult Survivors of Pediatric Brain Tumor
17. OFFERMANN, EA — "Returning to School is Harder than Fighting Cancer?": The Role of Neuropsychology in Supporting School Re-entry
18. PARKE, EM — Math achievement and neurocognitive risk factors in survivors of Acute Lymphoblastic Leukemia (ALL)
19. PETERSEN, M — Relationship between CA125 and cognitive function among a sample of Hispanics
20. PETERSON, R — Executive Functioning in Long-Term Survivors of Pediatric Low Grade Gliomas
21. RAGHUBAR, KP — Parent-Reported Functional Outcomes in Hispanic and Non-Hispanic Survivors of Pediatric Brain Tumor
22. ROTH, AK — Adaptive Functioning Outcomes in Survivors of Pediatric Brain Tumors Treated with Proton Radiotherapy
23. SCHIMMEL, WC — Cognitive Functioning of Patients with Newly Diagnosed Brain Metastases: A Regression-Based Normative Approach
24. SHULTZ, EL — Preliminary efficacy of Survivor's Journey: An online problem solving therapy for survivors of pediatric brain tumors
25. STRATTON, J — The Effects of Age on Cognitive Changes Following Hematopoietic Cell Transplantation
26. TARKENTON, T — Sex and APOE e4 Effect on Attention and Processing Speed in Pediatric Leukemia Survivors
27. VAN DER LINDEN, SD — The Course and Correlates of Subjective Cognitive Functioning in Meningioma Patients Before and After Surgery
28. VAN DYK, K — Cognitive function, health-related quality of life (HRQoL), and resting-state functional MRI (rs-fMRI) in long-term survivors of lower grade glioma (LGG): a multiple case study
29. VANNORSDALL, TD — Interventions for Breast Cancer-related Cognitive Fatigue: A Meta-analytic Review
30. VERHAAK, E — Multidimensional Assessment of Fatigue in Patients with Brain Metastases Before and After Gamma Knife Radiosurgery
31. VON BUTTLAR, AM — The Role of the Cerebellum in Executive Functioning: A Study of Pediatric Cancers and Brain Tumors
32. WARREN, EA — Cognitive Predictors of Social Adjustment in Pediatric Brain Tumor Survivors: A Comparison of Proton and Photon Radiation Therapy Groups
33. WARREN, EA — Cognitive Correlates and Concordance of Parent- and Patient-Report Ratings of Quality of Life in Pediatric Brain Tumor Survivors Treated with Proton versus Photon Radiotherapy

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34. WICKENHAUSER, M — Operationalizing Posterior Fossa Syndrome: A Survey of Experts
35. WITHROW, S — The Effect of Testosterone Suppression on Cognitive Functioning and Emotional Wellbeing Among Prostate Cancer Patients
36. ZEAL, J — Impact of Family Factors on Adaptive Functioning of Pediatric Brain Tumor Survivors

Epilepsy/Seizures

37. BALL, K — Pre and Post Surgical Neuropsychological Profile of Corpus Callosotomy Patient: A Case Study
38. BOLDEN, L — Attention Performance is Influenced by Cortical Excitability and Seizure Control in Patients with Idiopathic Generalized Epilepsies (IGEs)
39. BOLDEN, L — Cortical Excitability Influences Mood State in Patients with Idiopathic Generalized Epilepsies (IGEs)
40. CARNS, D — Utilization of DKEFS Fluency Measures to Determine Laterality in Epilepsy Patients
41. CARNS, D — Relationship of Seizure Locality and Error Rates on the Wisconsin Card Sorting Test
42. DOLAN, B — Characterizing Language Performance in Pediatric Patients with Intractable Epilepsy Pre- and Post-Surgical Resection
43. DUONG, P — The Impact of Inpatient Rehabilitation on Functional Outcomes in Children Following Hemispherectomy Surgery
44. ESCHLER, BD — Confirmatory Factor Analysis and Invariance of the Rey Auditory Verbal Learning Test in Individuals with Psychogenic Nonepileptic and Epileptic Seizures
45. FATOORECHI, S — Atypical Language Representation as a Protective Factor Against Verbal Memory Decline Following Epilepsy Surgery
46. FISCHER, M — The Impact of AED Polypharmacy on Cognitive Function in Refractory Temporal Lobe Epilepsy
47. FULLEN, CT — Improving Documentation of Behavioral Health Issues in an Oupatient Epilepsy Clinic
48. GRABYAN, JM — Patients with Psychogenic Non-Epileptic Seizures do not Evidence Impaired Cognition When Controlling for Performance Validity
49. HAAK, CL — Utility of MMPI-2 Critical Items in Differentiating Patients with Epileptic and Non-Epileptic Seizures
50. LOBLEIN, HJ — The Role of Stigma, Anxiety, and Seizure Severity on Quality of Life in Pediatric Epilepsy
51. MANDELBAUM, SA — Clinical Utility of Individual Neuropsychological Measures in Predicting Seizure Onset Zones In Epilepsy Patients Undergoing SEEG Monitoring
52. MCKITTRICK, K — Psychosocial Functioning and Interictal Epileptiform Discharges in Children with Benign Rolandic Epilepsy
53. MILLS, G — Prospective Memory in Children with Epilepsy
54. MOHANTY, M — Impact of Surgery on Cognitive Functioning in Patients with Drug Resistant Unilateral Mesial Temporal Lobe Epilepsy
55. NAKHUTINA, L — Comparison of the GAD-7 and BAI in a Diverse Sample of Adults with Intractable Epilepsy
56. NG, R — Beyond Seizure Factors: Cognitive Proficiency and Attention Functioning Correlates of Academic Skills Among Children with Epilepsy
57. NG, R — History of Neonatal Jaundice and Respiratory Distress Among Children with Epilepsy: Effects on Subcortical and Frontal Functions
58. NOSKER, J — The Neurochemical Relationship Between Epilepsy and Depression: Pediatric Assessment and Research Implications
59. REALE-CALDWELL, A — Comparing the Test of Premorbid Functioning (TOPF) and the North American Adult Reading Test (NAART) to estimate premorbid Wechsler Adult Intelligence Scale – 4th Edition FSIQ in a clinical sample with epilepsy
60. REYES, A — Differential impact of cerebrovascular risk factors on processing speed and executive function in patients with temporal lobe epilepsy
61. RODGIN, S — Predictors of Processing Speed Weaknesses in Children with Epilepsy
62. SEGALA, L — The Lateralizing Value of Neuropsychological Tests in Temporal Lobe Epilepsy
63. SHEAR, P — Visuospatial Contribution to the Learning of Semantically-Related Versus -Unrelated Word Pairs in Temporal Lobe Epilepsy
64. TENGOWSKI, L — A Task of Visual Integration Can Help Lateralize Seizure Location in Pre-Surgical Epilepsy Candidates
65. WILKINS, SS — Depression Negatively Influences Performance on Cognitive Screening in Epilepsy
66. WRIGHT, I — The Mirror Memory Task: Clinical Suitability for Predicting Post-Operative Cognitive Outcome in Epilepsy Surgery

Genetics/Genetic Disorders

67. ALBERT, P — Executive Functioning of Children and Adolescents with an Additional X Chromosome
68. BLACKWELL, MC — Neuropsychological Profile Associated with 12p13.33 Deletion
69. BRYANT, A — Neurocognitive Impairment Secondary to Cerebrotendinous Xanthomatosis
70. CHIANG, JA — Proposed Phenotype for Females with SETD5 Gene Variation: A Case Study
71. CLAWSON, A — Neurodevelopmental Profiles and Rehabilitation Outcomes in Beta-propeller Protein-Associated Neurodegeneration: Early Intervention Benefits
72. CRAWFORD, JL — The Relationship between White Matter Diffusion Indexes and the Phenotypic Traits of Lesch Nyhan Disease
73. CUREWITZ, A — Variability in neuropsychological functioning in patients with downstream RAS pathway mutations
74. DEL BENE, VA — Reduced White Matter Microstructural Integrity in Lesch-Nyhan Disease
75. DEL CASTILLO, A — Motor and Executive Dysfunction Drives Elevated Restrictive and Repetitive Behavior Ratings in Children with Neurofibromatosis Type 1 (NF1) as Compared to Children with Idiopathic Autism Spectrum Disorders (ASD)

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76. GLAD, D — Social Functioning in Children with Neurofibromatosis Type 1: A Longitudinal Investigation
77. GODFREY, M — Neuropsychological and Behavioral Profile of Mosaic Trisomy 14: A Case Study
78. GRUNBERG, VA — Genetic Secrets: The Neurocognitive Profile of Xia-Gibbs Syndrome
79. HALLIDAY, D — Neuropsychological Profile for Chromosome Deletion 16q22.3: A Rare Case Study
80. HASSARA, KE — Neuropsychological Functioning in an 8-year-old Male with Leigh Syndrome: A Case Study
81. HINTON, VJ — Developmental Lag in Multi-word Comprehension in Boys with Dystrophinopathy
82. KHANG, T — Neuropsychological Functioning in a Sample of Children with Fanconi Anemia or Aplastic Anemia
83. MACONE, B — Baseline Executive Functioning Predicts Current and Future Depression in Adults with Prodromal Huntington's Disease
84. PAPALEO, C — Neuropsychological Functioning in Individuals with Phenylketonuria Assessed through Measurement of Brain Biomarkers with MRI Spectroscopy
85. PARIDES, AA — Neuropsychological Functioning in a Case of Marfan Syndrome with Cerebrovascular Risk Factors
86. ROUHANDEH, AA — Case Report: 20-Month-Old Female with an Intragenic SHANK3 Duplication
87. ROWE, M — Characterizing Language in Children with ADNP Syndrome
88. SMITH, EE — Adaptive Functioning in Patients with Glucose Transporter Type 1 Deficiency
89. STEFANATOS, GA — Neuropsychological Findings in a Rare Case of a 4p.16 Chromosome Deletion

Other

90. DAS, K — A Quasi-experimental study to assess the effectiveness of an interventional package for the management of insomnia among Hemato-Oncological patients admitted in selected wards of tertiary Hospital in Northern India

10:15–11:45 AM **Invited Symposium 2. Cross Cultural Perspectives on Reading Disabilities**
Chair: Robin L. Peterson
Presenters: Markéta Caravolas, Cláudia Cardoso-Martins, Julie A. Washington
Broadway Ballroom North and Shubert Complex

1. PETERSON, RL — Cross Cultural Perspectives on Reading Disabilities
2. CARAVOLAS, M — Universals and Specifics of Reading Development in Different European Languages
3. CARDOSO-MARTINS, C — Characteristics of Early Reading Disabilities in Brazilian Portuguese
4. WASHINGTON, JA — Language, Dialect, and Literacy Development in Low-Income African American Children

10:15–11:45 AM **Paper Session 11. Multiple Sclerosis**
Moderator: Molly Zimmerman
West Side Ballroom Salon 3

1. ROMAN, CA — Cognition and Structural Connectivity in Multiple Sclerosis: Relationship Between Graph Theory Metrics and Neuropsychological Performance
2. FUCHS, T — Patterns of Structural and Functional Connectivity Predict Response to Cognitive Rehabilitation 2 Years Later in Multiple Sclerosis
3. ENGEL YEGER, B — Sensory processing difficulties in Multiple Sclerosis – prevalence and impacts on functional behavior
4. GOVEROVER, Y — The impact of symptomatic multiple sclerosis on complex everyday activities
5. JOSMAN, N — Integrating Virtual Reality in a Metacognitive Intervention for Training Executive Functions in People with Mild Cognitive Impairment
6. TOGLIA, J — Metacognitive strategy based intervention for persons with Multiple Sclerosis

10:15–11:45 AM **Symposium 9. Fatigue in Clinical Conditions: From Basic Research to Treatment**
Chair and Presenter: Ekaterina Dobryakova
Discussant: John DeLuca
Presenters: Benzi Kluger, Helen Genova, Birgitta Johansson
West Side Ballroom Salon 1

1. DOBRYAKOVA, E — Fatigue in Clinical Conditions: From Basic Research to Treatment
2. JOHANSSON, B — Long-Term Methylphenidate Treatment for Mental Fatigue After a Traumatic Brain Injury
3. GENOVA, H — Exercise as a Treatment for Fatigue In MS
4. KLUGER, B — Is Fatigue a Useful Construct for Neuropsychology?
5. DOBRYAKOVA, E — Reducing Fatigue Through Reward Presentation in Individuals with MS and TBI

10:15–11:45 AM **Symposium 10. Geriatric Neuropsychology: Impact of Contextual Factors on the Manifestation and Course of Illness**
Chair and Presenter: Deborah Koltai
Presenters: Mark Bondi, Dan Mungas, Sarah Farias, Jennifer J. Manly
West Side Ballroom Salon 2

1. KOLTAI, D — Geriatric Neuropsychology: Impact of Contextual Factors on the Manifestation and Course of Illness

2.	BONDI, M	Disclosure of Alzheimer's Disease Biomarker Risks: No Lasting Adverse Impact or Unintended Adverse Consequences?
3.	MUNGAS, D	Brain Atrophy Effects on Cognitive Decline Differ by Ethnicity and Race and are Moderated by Education
4.	FARIAS, S	Compensation Strategy Use Among Older Adults: Association with Diagnostic Status, Neuropsychological Function, and Everyday Function
5.	MANLY, JJ	Social Forces are Lifecourse Contextual Factors that Influence Brain Health in Aging

10:15–11:45 AM **Panel Discussion Presented by the INS Student Liaison Committee: Exploring Neuropsychology as an Interdisciplinary Endeavor**
Moderator: Vicki Anderson
Presenters: Erik Hessen, Lucia W. Braga, Lyn Turkstra, David Sabsevitz
West Side Ballroom Salon 4

11:45 AM–12:45 PM **Plenary E. The Brain that Thinks About Minds**
Presenter: Rebecca Saxe
Broadway Ballroom North and Shubert Complex

1.	SAXE, R	The Brain that Thinks About Minds

12:45–1:45 PM **Lunch (On Own)**
Conference-Wide

1:45–3:00 PM **Poster Session 7. Cognitive Intervention & Neurobehavioral Domains**
Broadway Ballroom South and Majestic Complex

Cognitive Intervention/Rehabilitation

1.	DON, A	Treating Children with Neurodevelopmental Differences: Developing and Integrating Neuropsychologically-Based Treatment with Psychotherapy
2.	ALVERSON, WA	Functional Improvement Following Participation in a Community Reintegration Program for Brain Injury Rehabilitation
3.	BAREFOOT, C	Return to Driving Readiness and Performance on Neuropsychological Assessment in a Sample of Individuals with Brain Injury
4.	BERTRAND, E	Efficacy of the Brazilian Version of the Cognitive Stimulation Therapy in Older Adults with Dementia and Their Caregivers: a Randomized Controlled Trial
5.	CABLE, ST	Cognitive Functioning and Health-Related Outcomes Among Injured Service Members
6.	DESPOTI, AA	Cognitive rehabilitation using virtual reality: a systematic review
7.	DEVAUGHN, S	Relationship Between Perceived and Objective Change After Cognitive Rehabilitation in Veterans with Chronic TBI
8.	DIVERS, R	Virtual Reality Training of Everyday Tasks for Older Adults with Cognitive Impairment
9.	DUITS, AA	Gaming to Train Cognition in Parkinson's Disease: an Intervention for the Happy Few?
10.	ESPINOSA, N	Maintenance of Social Participation Gains One-Year After Comprehensive Brain Injury Rehabilitation for Acquired Brain Injury
11.	GARCIA-GUERRERO, CE	Use of Technology in Cognitive Rehabilitation in Mexico and Spain
12.	HENRY, M	Perceiving is Believing: The Effect of Computerized Cognitive Remediation on Mood in Acquired Brain Injury Participants
13.	HUSS, OJ	The Acceptability of Compensatory and Brain Health Strategies in Older Adults with Subjective Cognitive Concerns
14.	KORNBLITH, E	Telehealth Delivery of a Manualized Executive Function Training to Older Veterans with History of TBI: Feasibility, Acceptability, and Modifications Required
15.	LANDINEZ, DA	Working Memory Training After Stroke
16.	LIBERTA, T	An Investigation of Cogmed Working Memory Training (CWMT) for Neurological Surgery Patients
17.	NOVAKOVIC-AGOPIAN, T	Long Term Outcomes of Goal-Oriented Attentional Self-Regulation Training in Veterans with PTSD and Mild TBI
18.	O'SHEA, D	Prediction of Response to Behavioral Interventions with MRI-Based Hippocampal Subfields in Mild Cognitive Impairment: Preliminary Findings
19.	RIGGALL, E	Parent Participation in Cognitive Remediation Therapy for Children with Executive Dysfunction
20.	SADEGHI, M	Examining Cogmed Outcomes in a Community Sample of ADHD Youth: Does Training Engagement Matter?
21.	SALDANA, DG	Examining Chess Training as Cognitive Training in Children with Parent-Reported Attentional Difficulties – A Pilot Study
22.	SCHUBMEHL, S	CogSMART Efficacy in a Mixed Clinical Sample
23.	SCIULLI, S	Firefighter Cognitive Performance Following a Live Burn

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Executive Functions/Frontal Lobes

Language and Speech Functions/Aphasia

Memory Functions/Amnesia

Other

Visuospatial Functions/Neglect/Agnosia

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113. SHEPHARD, E — Idiopathic acquired prosopagnosia or right temporal lobe variant of frontotemporal dementia: A case study

1:45–3:15 PM — **Invited Symposium 3. Global Neuroscience: Impact of Culture, Resources, and Education**
Chair: Deborah Koltai
Presenters: Lucia W. Braga, Kevin Robertson, Martin Kaddumukasa, Michael J. Boivin
Broadway Ballroom North and Shubert Complex

1. KOLTAI, D — Global Neuroscience: Impact of Culture, Resources, and Education
2. BRAGA, LW — Maximizing Resource Limitations with a Validated Model of Neurorehabilitation in Brazil
3. ROBERTSON, K — Challenges in HIV Neurocognitive Clinical Research in Resource Limited Settings
4. KADDUMUKASA, M — Understanding Practical and Cultural Drivers of Neurologic Health Care Utilization
5. BOIVIN, MJ — Challenges Faced and Lessons Learned in the Application of Global Neuroscience to Prevent Konzo Disease in the Democratic Republic of Congo

1:45–3:15 PM — **Paper Session 12. Aging- General**
Moderator: Benjamin Hampstead
West Side Ballroom Salon 2

1. CASALETTO, KB — Cognitive Aging is Not Created Equally: Differentiating Unique Cognitive Phenotypes in "Normal" Adults
2. KOSCIK, R — Validity Evidence for a Research Pre-MCI Cognitive Status Group: "Cognitively Unimpaired - Declining"
3. GIFFORD, K — A Comparison of Subjective Cognitive Decline Tools in Cognitively Unimpaired Older Adults
4. THOMAS, KR — Objective Subtle Cognitive Decline, but Not Subjective Memory Complaint, Predicts Progression in Cognitively Normal Individuals
5. SAMUEL, SS — Association of Perceived Discrimination to Cognition among African Americans
6. DJUKIC, N — Leisure Activities and Cerebral Amyloid Burden in Clinically Normal Older Adults: The role of APOEe4

1:45–3:15 PM — **Paper Session 13. Pediatric TBI**
Moderator: Alison M. Colbert
West Side Ballroom Salon 3

1. TREBLE-BARNA, A — Influence of Inflammation-Related Genes on Neurobehavioral Recovery Following Traumatic Brain Injury During Early Childhood
2. VERHELST, H — Altered Structural Connectome in Young Patients with Traumatic Brain Injury: Impaired Rich Club Organization and Increased Local Connectivity
3. FISHER, AP — Social and Behavioral Outcomes Following Online Problem-Solving Therapy for Children with Traumatic Brain Injury
4. MCCURDY, MD — Clinical Utility of the Cognitive and Linguistic Scale (CALS) for Predicting Long-Term Functional Outcome in Youth After Inpatient Brain Injury Rehabilitation
5. LEBLOND, E — The influence of environmental factors on quality of life following TBI in very young children

1:45–3:15 PM — **Symposium 11. Patient-Reported Outcomes (PROs) in Neuropsychology Research and Practice: Bridging Test Data and Lived Experience**
Chair and Presenter: Susan Vandermorris
Presenters: Angela K. Troyer, Laura Rabin, Brian Levine, Komal Shaikh
West Side Ballroom Salon 1

1. VANDERMORRIS, S — Patient-Reported Outcomes (PROs) in Neuropsychology Research and Practice: Bridging Test Data and Lived Experience
2. TROYER, AK — What Makes a Good PRO? A Systematic Review and Meta-Analysis of Measurement Properties of the Multifactorial Memory Questionnaire
3. RABIN, L — Using Patient-Reported Outcomes (PROs) for Early Detection: Subjective Cognitive Decline in Preclinical Alzheimer's Disease
4. LEVINE, B — Self-Reported Remote Memory Abilities and their Relationship to Cognitive Aging
5. SHAIKH, K — An In-Depth Look at the Experience of Memory Change in Healthy Aging and Mild Cognitive Impairment
6. VANDERMORRIS, S — Using Participant-Reported Outcomes (PROs) to Evaluate Interventions: A Systematic Review and Meta-Analysis of the Impact of Memory Intervention Programs in Healthy Older Adults

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1:45–3:15 PM

Symposium 12. Biopsychosociocultural Considerations for Updated Criteria in the Diagnosis of HIV-associated Neurocognitive Disorder: An International Discussion

Chair and Presenter: Monica G. Rivera Mindt
Discussant: Desiree A. Byrd
Presenters: Robert H. Paul, Uraina Clark, Sean Rourke, Lucette A. Cysique
West Side Ballroom Salon 4

1. RIVERA MINDT, MG — Biopsychosociocultural Considerations for Updated Criteria in the Diagnosis of HIV-Associated Neurocognitive Disorder: An International Discussion
2. PAUL, RH — Neuropathogogeneic Mechanisms and Neural substrates for HAND Criteria
3. CLARK, U — Early-Life Stress Exposure: A Biopsychosocial Comorbidity with Potential Relevance to HIV-Associated Neurocognitive Disorders
4. ROURKE, S — "I'm Just Forgetting and I Don't Know Why": Exploring How People Living With HIV-Associated Neurocognitive Disorder View, Manage, and Obtain Support for Their Cognitive Difficulties
5. RIVERA MINDT, MG — HIV Health Disparities & Sociocultural Considerations for the Diagnosis of HIV-Associated Neurocognitive Disorders in Diverse Populations
6. CYSIQUE, LA — Optimally assessing neurocognitive function in HIV-positive Culturally and Linguistically Diverse (CALD) Australian Populations

3:15–3:30 PM

PM Coffee Break

Broadway Ballrooms South

3:30–4:45 PM

Poster Session 8. MCI & Dementia

Broadway Ballroom South and Majestic Complex

Aging

1. BOTT, N — Composite cognitive performance characteristics of superagers in a population-based sample
2. BOTT, N — Superior error monitoring in superagers: evidence from a population-based sample
3. BOTT, N — Decreased risk of cognitive decline in superagers: evidence from a population-based sample
4. CHAN, ML — Objective Measures of Physical Exercise Among Older Adults in a Multidimensional Intervention to Promote Brain Health
5. HAYS, CC — APOE Genotype Modifies the Interactive Effects of Cerebral Blood Flow and Cortical Thickness on Memory in Cognitively Healthy Older Adults

Dementia (Alzheimer's Disease)

6. ABREU, L — Relationship of Proximity to Parks and Green Spaces with Cognitive Function among Older, Urban Adults
7. ALLISON, S — Alzheimer's Disease Biomarkers, Neurodegeneration, and Longitudinal Verbal Learning and Memory Performance
8. APPLE, AC — Greater Dorsolateral Prefrontal Cortex Volume is Related to Polygenic Risk Score in Healthy Older Adults
9. BANGEN, KJ — Reduced Regional Cerebral Blood Flow Is Associated With Poorer Cognition In Older Adults With Type 2 Diabetes
10. BANKS, SJ — Cognitive Correlates of Amyloid Deposition in Alzheimer's Disease
11. BANUELOS, D — Different CVLT Subscales Predict Shopping Skills in Alzheimer's disease and Mild Cognitive Impairment
12. BELLAALI, Y — Do Differences Between Self- and Spouse-Evaluation of Cognitive Performance Signal Incipient Anosognosia and Predict Cognitive Decline in Healthy Older Adults?
13. BLANKEN, A — Women with higher systolic blood pressure variability are at increased risk of dementia
14. BOCANEGRA, Y — Visual Memory Performance is Associated with Markers of Brain Pathology in Preclinical Autosomal Dominant Alzheimer's Disease
15. BORISH, S — The Relationship Between Amyloid Status and Neuropsychological Profile in Ambiguous Cases: An Exploratory Analysis
16. BOVE, J — Cognitive Decline and Subjective Memory Complaints: Patient and Informant Discrepancies
17. BROTHERS, S — Detecting Dementia in Down Syndrome with the Severe Impairment Battery (SIB)
18. BRUNET, HE — The Relative Importance of Hippocampal Volume and Sex in Verbal Learning and Memory within a Clinical Sample of Older Adults
19. BUCHHOLZ, A — Improved Episodic Memory with the Modified Atkins Diet in Alzheimer's Disease
20. CAO, X — Differential Decline in Word Generation from Letter and Semantic Categories in Preclinical Alzheimer's Disease
21. CHAPMAN, K — Sexual Disinhibition and Family Caregiver Burden in Dementia
22. DE VITO, AN — Further Evidence That Year-to-Year Variability in Performance is an Early Sign of Cognitive Impairment
23. DEMETROPOLIS, S — Semantic memory processing in early stage Alzheimer disease: Behavioral and electrophysiology evidence
24. DING AND N. AN, H — A data-driven approach to designing stepwise diagnostic rules for Alzheimer's disease from neuropsychological tests: the Framingham Heart Study

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MCI (Mild Cognitive Impairment)

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110. RÉMILLARD-PELCHAT, D — Neuroanatomical Alterations Underlying Mild Cognitive Impairment in REM Sleep Behavior Disorder
111. RHODES, E — Grit and Cognitive Functioning in Healthy Aging and Mild Cognitive Impairment
112. RICE, J — Fundamental Attribution Error in the Diagnosis of Early-Stage Alzheimer's Disease Versus Mild Cognitive Impairment
113. SANTORELLI, GD — Differential Patterns of Subjective Cognitive Complaints and Contributions of Depression in aMCI and Cognitively Intact Clinic Patients
114. SIVAJOHAN, B — Cogniciti's Brain Health Assessment and the MoCA: A Comparison of Screening Measures for Diagnosis of aMCI
115. SUNDERMANN, EE — Sex Effects of Prediabetes on Cognition and Brain Metabolism Using FDG PET: An Alzheimer's Disease Neuroimaging Initiative Study
116. WALL, KM — Cognitive Impairment Corresponds with a Lower Body Mass Index (BMI): A Cross-Sectional Analysis of Older Adults with Mild Cognitive Impairment (MCI) and Caregivers
117. WASSERMAN, VJ — Machine Learning Analysis of the Clock Drawing Test (dCDT) for Differential Diagnosis Between Mild Cognitive Impairment Subtypes and Alzheimer's Disease
118. WEBBER, TA — Characterizing Verbal Learning Acquisition in Mild and Major Neurocognitive Disorder using Latent Growth Modeling
119. WONG, CG — Comparison of Jak/Bondi Neuropsychological Criteria for MCI: Effect of Number of Tests
120. WOODARD, JL — Early Reduction of Auditory Verbal Learning Test Learning Slope in Apolipoprotein E ε4 Carriers with Preclinical Mild Cognitive Impairment

3:30–5:00 PM

Symposium 13. Cognition in Action: Considerations for Defining Complex Cognitive Constructs of Everyday Functioning

Chair: Maria T. Schultheis
Presenters: Jillian Tessier, Tania Giovannetti, Preeti Sunderaraman, Martina Azar, Rebecca Williams
Broadway Ballroom North and Shubert Complex

1. SCHULTHEIS, MT — Cognition in Action: Considerations for defining complex cognitive constructs of everyday functioning
2. TESSIER, J — Conceptual Model for the Measurement of Multitasking
3. GIOVANNETTI, T — Neuropsychological Models for Goal-Directed, Everyday Activities: Focus on Improving Neuropsychological Assessment of Dementia and MCI
4. SUNDERARAMAN, P — The Influence of Education, Math skills and Well-being on Objective Financial Decision Making
5. AZAR, M — Investigating Online and Offline Awareness of Executive Dysfunction in Individuals with TBI
6. WILLIAMS, R — Emotional Intelligence: An Argument for Measurement in Neurological Populations

3:30–5:00 PM

Paper Session 14. Adult TBI

Moderator: Jose Lafosse
West Side Ballroom Salon 1

1. KRCH, D — Cognitive Reserve Protects Against Memory Decrements Associated with Neuropathology in Traumatic Brain Injury
2. WEBER, E — Visuospatial Functioning Predicts Benefit from Imagery-Based Memory Treatment in Individuals with TBI
3. PONSFORD, JL — Cognitive Reserve And Age Predict Cognitive Recovery Following TBI
4. BRENNER, EK — The Benefit of Network Hyperconnectivity After Traumatic Brain Injury is Dependent on Cognitive Reserve
5. SCHAFFERT, J — Traumatic Brain Injury History and Dementia Onset in Autopsy-Confirmed Neurodegenerative Conditions
6. DENNIS, E — Neural Correlates of Depressive Symptoms after Brain Injury: Preliminary Results from the ENIGMA Military Brain Injury Group

3:30–5:00 PM

Paper Session 15. Cancer Across the Lifespan

Moderator: William Mautz
West Side Ballroom Salon 2

1. JACOLA, L — Impact of Intensified Intrathecal (IT) Therapy on Acute and Long-term Neurocognitive Outcomes in Children with Acute Lymphoblastic Leukemia (ALL)
2. SABIN, ND — Cortical Thickness and Neurocognitive Performance in Adult Survivors of Hodgkin Lymphoma
3. BANERJEE, P — Comorbid Neurocognitive Impairment in Long-Term Survivors of Childhood Cancer: A Report from the St. Jude Lifetime Cohort Study
4. PARTANEN, M — Predicting Quality of Life (QOL) Among Survivors of Childhood Acute Lymphoblastic Leukemia (ALL) Using On-Therapy Neurocognitive Assessment
5. CHILD, AE — Academic Fluency in Pediatric Brain Tumor Survivors Treated with Proton Versus Photon Radiation Therapy
6. TONNING OLSSON, I — Pain and Neurocognitive Outcomes in Adult Survivors of Childhood Cancer

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3:30–5:00 PM **Paper Session 16. Pediatric Neuropsychology in Spanish-Speaking Countries**
Moderator: Amy Connery
West Side Ballroom Salon 3

1.	ARANGO-LASPRILLA, JC	An International Online Survey of Professions Practicing Pediatric Neuropsychology in Spanish-speaking Countries
2.	OLABARRIETA-LANDA, L	Normative data for 10 Commonly Used Pediatric Neuropsychological Tests in 11 Spanish-speaking Countries
3.	BENITO SÁNCHEZ, I	Prevalence of Low Scores on Learning and Memory Test Outcomes in a Pediatric Sample from 11 Spanish-speaking Countries
4.	RAMOS USUGA, D	Prevalence of Low Scores on Executive Function Test Outcomes in a Pediatric Sample from 11 Spanish-speaking Countries
5.	BENITO SÁNCHEZ, I	Prevalence of Low Scores on Psychomotor Speed and Attention Tests in a Spanish-Speaking Pediatric Population from 11 Countries
6.	RIVERA, D	Machine Learning Classification for Intellectual Disability

3:30–5:00 PM **Paper Session 17. Parkinson's Disease / Movement Disorders**
Moderator: Guy Vingerhoets
West Side Ballroom Salon 4

1.	BRESLIN, K	The Moderating Effects of Cognitive Impairment and Depression on Perceptions of Behavioral Symptoms in Patients with Parkinson's Disease and Their Caregivers
2.	DHIMA, K	Does Tremor Type Matter? Rethinking the Traditional Tremor-Dominant vs. Postural Instability and Gait Difficulty Subtypes of Parkinson's Disease
3.	BEZDICEK, O	Serial Order Recall in Working Memory Across the Cognition Spectrum of Parkinson Disease
4.	COLVIN, LE	Psychological Factors and Neural Substrates Associated with Metacognition among Older Adults with Essential Tremor
5.	HELCER-BECKER, J	The Relationship Between FDG-PET Disease-Specific Biomarkers and Recognition Memory in Patients with Parkinson's Disease
6.	HANSON, K	Impulse Control Disorders in Parkinson's Disease Before and After Deep Brain Stimulation

5:00–6:00 PM **Plenary F (Birch Memorial Lecture) Just Babies: The Origins of Good and Evil**
Presenter: Paul Bloom
Broadway Ballroom North and Shubert Complex

1.	BLOOM, P	Just Babies: The Origins of Good and Evil

6:00–7:30 PM **Panel Discussion Presented by the INS Student Liaison Committee: The Future of Neuropsychology: Diversity, Technology, and Staying Relevant**
Moderator: Ann-Marie Raphail
Presenters: John Medaglia, Tania Giovannetti, Dawn Mechanic-Hamilton, Benjamin Hampstead, Beatriz MacDonald
Broadway Ballroom North and Shubert Complex

SATURDAY, FEBRUARY 23, 2019

7:20–8:50 AM **CE Workshop 11. Disrupting Academic Communication: Creating Vivid, Engaging Access to- and Excitement About -our work as Neuropsychologists**
Presenter: Karen Postal
West Side Ballroom Salon 2

1.	POSTAL, K	Disrupting Academic Communication: Creating Vivid, Engaging Access to- and Excitement About -our Work as Neuropsychologists

7:20–8:50 AM **CE Workshop 12. Neuropsychology of Children Exposed to Heavy Metals: Assessment and Intervention to Improve Executive Functions**
Presenter: Neander Abreu
Co-Presenter: Chrissie Carvalho
West Side Ballroom Salon 4

1.	ABREU, N	Neuropsychology of Children Exposed to Heavy Metals: Assessment and Intervention to Improve Executive Functions

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9:00–10:15 AM

Poster Session 9. Concussion/TBI Across the Lifespan
Broadway Ballroom South and Majestic Complex

Concussion/Mild TBI (Adult)

1. BEDARD, M — Long-term impairment in executive functioning following mild traumatic brain injury with loss of consciousness
2. BELKONEN, S — Consistency of Symptom Report in Veterans with Mild Traumatic Brain Injury
3. BENNETT, L — Differences in Cognition and Regional Brain Volume in Relation to Exposure to Professional Combat Sports
4. BODAPATI, AS — Failure of one Performance Validity Test is Associated with Increased Likelihood of Failing Additional Performance Validity Tests in Individuals with a History of Mild Traumatic Brain Injury
5. BROWN, VS — Racial-Ethnic Differences in Self-Report on the Frontal Systems Behavior Scale Following Mild Traumatic Brain Injury
6. BUSCH, TA — The Correlation Between Sleep Disturbance and Headache Severity in Individuals With Persistent Post Concussive Symptoms
7. COOK, C — Relationship of Mild Traumatic Brain Injury (mTBI) Information to Illness Beliefs in Individuals with High Health Anxiety
8. DACOSTA, A — Scores on Sports Motivation Scale Remain Stable from Baseline Through Concussion Recovery in Collegiate Athletes
9. DAILEY, NS — Self-Initiated Recall Strategies in Mild Traumatic Brain Injury: Identifying the Neural Correlates
10. DAVIS, J — Baseline Endorsement on the Post-Concussion Scale in College Athletes
11. DELL, K — Examining Headache & Postural Control Variability in Serial Blast-Related Training Exposure
12. DUCCA, EL — Effects of balance on concussion history in student-athletes with learning disability and ADHD
13. ESBIT, S — Making a List and Checking it Twice: Episodic Verbal Recall in Mild Traumatic Brain Injury
14. FORD, AI — A Systematic Review of Treatments for Psychiatric Symptoms of Mild Traumatic Brain Injury
15. FRATZKE, VJ — Does the FrSBEsbe Account for Variance Above and Beyond Emotional Functioning in Semi-Acute Mild Traumatic Brain Injury?
16. GALLAGHER, K — Complex Verbal Working Memory in Military Veterans with and without mTBI
17. GALLAGHER, VT — Eye Movement Performance and Associations with Clinical Outcomes in Female Athletes with Recent Mild Traumatic Brain Injury
18. HARFMANN, EJ — Chronic mTBI predicts presence of retinal pathology: implications for assessment and management of posttraumatic visual distress and migraine
19. HOLIDAY, KA — Neural Activation During a Working Memory Task in Mild to Moderate Traumatic Brain Injury
20. HOUCK, Z — The Relationship between Subjective Cognitive Symptoms and Objective Neurocognitive Functioning in a Concussed Sample Presenting to a Specialty Clinic
21. HROMAS, G — Demographic and Comorbidity Influences on CNS Vital Signs Performance in a Persistent Post-Concussion Population
22. JURICK, S — History and number of blast exposures are related to myelin water fraction in OEF/OIF Veterans
23. KILLGORE, W — Improving Executive Functioning in Mild Traumatic Brain Injury with Daily Morning Blue Light Therapy
24. LAPIRA, K — Elevated Pulse Pressure is Associated with Improved Inhibition-Switching Performance in APOE-ε4 Carriers with Mild Traumatic Brain Injury
25. LEE, BG — Cognition, Depression, and Brain Volumes in Professional Boxers: Baseline and Longitudinal Data from the Professional Fighters Brain Health Study
26. LEE, Y — Clinical Validity of the MMPI-2-RF Cognitive Complaints Scale on Neuropsychological Evaluation with a Concussion Population
27. LU, HY — Psychosis After Traumatic Brain Injury in Marginally Housed Individuals
28. MCKAY, D — Prevalence of Traumatic Brain Injury, Post-Traumatic Stress Disorder, and Pain in a Sample of Rural Veterans Undergoing a Comprehensive Traumatic Brain Injury Evaluation
29. MCMILLAN, T — The Role of Negative Affect in Reporting Persistent Post-Concussive Symptoms
30. MEINHAUSEN, CE — Identifying Memory Retrieval Strategies Following a Mild Traumatic Brain Injury Using the CVLT-II
31. MEYER, J — Effects of Head Trauma on Planning and Problem Solving in a Sample of Victims of Intimate Partner Violence
32. MILES, MM — Metacognitive Moderators of Cogniphobia in a TBI Sample
33. PALUMBO, A — Integrity of White Matter Tracts Post mTBI is Associated with PTSD and Neurobehavioral Symptoms
34. PARKER, HA — Personality Characteristics Predict Chronic Symptoms and Recovery Course after Mild Traumatic Brain Injury
35. PARKER, HA — The Visual Pattern Sensitivity Test (VPST): A Novel Approach for the Assessment of Light Sensitivity Associated with Mild TBI and Post-Traumatic Migraine
36. POLEJAEVA, E — How Do You Characterize "Breachers' Brain"?
37. RAIKES, A — Anterior Cingulate Gyrus Volume Predicts Changes in Post-mTBI Daytime Sleepiness Following Blue Wavelength Light Therapy
38. RAU, H — Self-Reported Prospective and Retrospective Memory in OEF/OIF/OND Veterans with a History of mTBI: Relationships with Neuropsychological Functioning and Quality of Life
39. REYES, J — The Potential of Head Acceleration Events in Australian Football League (AFL) and Australian Football League Women's (AFLW) to Augment Current Best Practice in Concussion Screening
40. REYNOLDS, MK — Examining the Effect of Terminology & Emotional Difficulties on Perceptions of Mild Traumatic Brain Injury

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41. SCHEIBEL, RS — Verbal Memory Dysfunction Following Deployment-Related Traumatic Brain Injury
42. SEKELY, A — Comparison of Cognitive and Occupational Functioning in Patients who have Sustained an Uncomplicated Versus Complicated Mild Traumatic Brain Injury in the Post-Acute Recovery Period
43. SORG, SF — Reduced Time-Based Prospective Memory Performance in Veterans with Histories of Mild Traumatic Brain Injury and Associations with White Matter Microstructure
44. STEPHEN, S — Professional Fighting Style as a Moderator between Fight Exposure and Cognition
45. STOCKS, J — Remote History of Concussion Associated With Deficits in Eye Movement Measures of Executive Functioning Among Asymptomatic Female Athletes
46. SVINGOS, AM — The Relationship Between Concussion Symptoms and Recovery Expectations Among Patients Presenting to an Interdisciplinary Concussion Clinic
47. THRASHER, S — Accuracy of Knowledge About Traumatic Brain Injury Among VA Healthcare Providers
48. TROYANSKAYA, M — Resiliency and Deployment-Related Characteristics as Predictors of Societal Participation Following Combat Deployment
49. UY, PJ — Sports Concussion Assessment Tool-3 (SCAT3) and Objective Impairments on Neuropsychological Tests
50. VENKATESAN, UM — Deployment Trauma Moderates Age-Related Decline in Cortical Thickness
51. VOELBEL, GT — Cerebral White Matter Integrity In Mild Traumatic Brain Injury Adults Predicts Cognitive Deficits: A Longitudinal Study
52. WALSH, MJ — Use of Selective Serotonin Reuptake Inhibitors Moderates the Relationship Between Hippocampal Volume and Verbal Learning in Mild Traumatic Brain Injury
53. WILLMOTT, CJ — SCAT3 Changes from Baseline and Associations with X2 Patch Measured Head Acceleration in Amateur Australian Football Players
54. WILLMOTT, CJ — Examining the Effects of Exercise and Practice on the SCAT3, and Association Between Mood, Pain & SCAT3 Symptom Report in Athletes
55. WRIGHT, MJ — Comparison of Memory Process Disruptions in Single-Impact Traumatic Brain Injury and Repeat Sports-Related Concussive/Subconcussive Injury in Retired NFL Players
56. MARTINDALE, SL — Blast Exposure: Cognitive, Biological, and Behavioral Effects Beyond TBI
57. MARTINDALE, SL — Effects of Blast Exposure on Cognition beyond PTSD and TBI
58. SHURA, RD — The Salisbury Blast Exposure Interview
59. ROWLAND, JA — The Effect of Blast Exposure on Functional Brain Networks
60. MISKEY, HM — Blast Exposure as a Risk Factor for PTSD
61. EPSTEIN, EL — Blast Exposure and PTSD Recovery
62. YANG, C — Longitudinal work quality of patients with post-concussion symptoms

Concussion/Mild TBI (Child)

63. BROOKS, BL — Sleep Disruption After Concussion in Adolescents: Characterization and Trajectory Over Time
64. BROOKS, BL — Insomnia Ratings in Adolescents with Slow Recovery From Concussion
65. BROOKS, BL — Predicting headache before and after neuropsychological testing in youth with protracted recovery from concussion
66. CABLE, ST — SCAT3 Symptom Clusters and Associations with Neuropsychological Functioning and Return-to-Learn Following Youth Concussion
67. CLARK, AL — Older age is associated with reduced regional CBF in regions vulnerable to Alzheimer's disease in military veterans with mild TBI
68. COOK, NE — Multiple Past Concussions in High School Hockey Players: Examining Cognitive Functioning and Symptom Reporting
69. GAUDET, C — Immediate Post-Concussion and Cognitive Testing (ImPACT) Discriminant Utility of Regression-Based Approaches in Appraising Intraindividual Differences
70. GERST, EH — Depressed, Anxious, and Tired: Reporting of Post-Concussion Fatigue in Adolescents with Anxiety and Depression
71. GIOIA, GA — Clinically Meaningful Reliable Change Metrics for Concussion Subtypes in Youth
72. KARR, JE — Concussion History and Subacute Symptom Severity Among High School Athletes
73. KWAN, V — A Scoping Review of Pain in Children Following Traumatic Brain Injury: Is There More Than Headache?
74. LAURENDEAU-MARTIN, J — Preliminary Validation of the REACTIONS Questionnaire: a Post-Concussive Symptoms Checklist for Early Childhood
75. LAW, RK — Adolescent's Percieved Concussion Symptoms and Executive Functioning: Can we Trust Self-Reported Deficits?
76. ROSS, E — Mood Disturbance and Pediatric Concussion Recovery: Does it Depend on Age, Sex, or Type of Injury?
77. SACK, L — The Effect of Active Rehabilitation on the Psychological Well-Being of Adolescents with Post-Concussion Symptoms
78. SHERRY, NS — Neurocognitive Screening for Concussion Predicts Academic Reading Performance After Injury
79. VAUGHAN, CG — Neuropsychological Function After a Season of Youth Contact Football in Non-Concussed Athletes

Other

80. CORNWELL, MA — Biopsychosocial Synthesis of Neuropsychological Assessment in a Care Provider with Brain Injury Secondary to Physical Assault by a Patient: A Case Study
81. HAMMOND, JA — Helmet Use, Demographic Factors, and Bicycle Riding Behaviors Among College-Aged Individuals
82. OSBORN, A — The Association Between the Polytrauma Clinical Triad and Memory in OIF/OEF/OND Veterans

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TBI (Moderate-Severe; Adult)

83.	BERNIER, RA	Perceived Discrimination in Older Adults with a History of Moderate or Severe Traumatic Brain Injury: A Pilot Study
84.	BRETT, BL	Examination of two TBI functional outcome measures using item response theory: Superior test information of the FSE as compared to the GOSE
85.	CHIOU, KS	Modulatory Effects of Feedback on Metacognitive Confidence After Traumatic Brain Injury
86.	FEIGER, JA	Differences in Neuropsychological Profiles Based on Depression Severity in Persons with Acquired Brian Injury
87.	GREISMAN, J	Rehabilitation Outcomes at 1 and 2 years Post-TBI Among Civilians and Military Service Members in the TBI Model System National Database
88.	GROSSNER, E	Brain Lesion Proximity to Hubs After TBI Influences Network Plasticity
89.	JOSEPH, AC	Long-Term Cognitive and Functional Outcomes in Individuals with Multiple Head Injuries
90.	KLECHA, H	Neural Correlates of Extrinsic and Intrinsic Outcome Processing in Individuals with TBI
91.	KORNBLITH, E	Impact of PTSD Symptoms on Long-Term Cognitive Outcomes for Veterans with TBI
92.	KUCUKBOYACI, N	Can We Account For Facial Affect Processing Following TBI and Save Face for Neuropsychological Batteries?
93.	LANCASTER, K	Community Integration in Traumatic Brain Injury: the Contributing Factor of Emotion Recognition Deficits
94.	LANDAU, A	Feasibility of the Brief Test of Adult Cognition by Telephone (BTACT) in Individuals in post-traumatic amnestic states after recovery from Moderate-Severe TBI
95.	LOPEZ-HERNANDEZ, WD	The Influence of Bilingualism on Traumatic Brain Injury California Verbal Learning Test Performance
96.	MULLEN, CM	Family Reported Dysexecutive Deficits Following TBI Compared to Neuropsychological Assessment Results
97.	MURTHY, J	How Normal is Normal? Examining Overall Battery Performance in Relation to Orientation Log (O-Log) Scores
98.	PAREDES, J	Examining Cognitive Domains in Moderate to Severe Traumatic Brain Injury: A Meta-Analysis
99.	POSECION, L	Change in Depression and PTSD Symptoms is Associated with Improvement in Functional Performance 6 Months After Executive Function Training Among Veterans with TBI
100.	POSECION, L	Relationship Between Change in Symptoms of Depression and PTSD and Neuropsychological and Functional Task Performance After Executive Function Training in Veterans With TBI
101.	RABINOWITZ, AR	Retrospective Assessment of Pre-injury Positive Personality Traits: Reliability and Validity of Self-report in Persons with Acute Traumatic Brain Injury
102.	ROPER, CL	Emotion Fluency and Personal Narratives Following Moderate/Severe Traumatic Brain Injury
103.	SCRIBNER-WEISS, B	Psychoeducation in Severe Traumatic Brain Injury: A Feasibility Study
104.	STEPIEN, D	Relationship Between Psychological Adjustment and Utilization of Medical Resources in a Severe Brain Injury Population
105.	SWENSON, C	Utility of Postmortem Verbal Autopsy Interview in Traumatic Brain Injury (TBI) Research
106.	WRIGHT, HH	Improving Cognitive Function in Traumatic Brain Injury: Evidence from Two Treatments

TBI (Moderate-Severe; Child)

107.	CERMAK, C	Characterization of speech, language, and cognitive communication impairments in sub-acute preschool traumatic brain injury: A retrospective chart review
108.	FISCHER, J	Frontostriatal White Matter Integrity Relations With 'Cool' and 'Hot' Self-Regulation Following Pediatric Traumatic Brain Injury
109.	HAIGHT, A	Utilization and Implications of PEPS-C in Pediatric TBI
110.	LENGENFELDER, J	Facial and Prosodic Emotion Recognition in Pediatric TBI
111.	LENGENFELDER, J	Measuring Social Communication in Pediatric TBI
112.	MAROUSIS, NC	Can Personal Biology Account for Unexplained Heterogeneity in Neurobehavioral Outcomes Following Pediatric Traumatic Brain Injury? Feasibility and Acceptability of Research Methods
113.	PATRONICK, JJ	Assessment of Acute Neuropsychological Functioning Following Pediatric TBI Using the NIH Toolbox- Cognition Battery
114.	SHISHIDO, Y	Contribution of Preinjury Functioning to Cognitive Recovery of Pediatric Patients with Moderate to Severe TBI during Inpatient Rehabilitation
115.	SMITH-PAINE, J	Recovery Trajectories of IQ after Pediatric TBI: A Latent Class Growth Modeling Analysis

9:00–10:00 AM **Media Panel: Concussion Science and the Media: The Good, the Bad, and the Ugly**
Moderator: Keith Yeates
Presenters: William Barr, Karen Postal, Jason Chung, Daniel Engber
Broadway Ballroom North and Shubert Complex

9:00–10:30 AM **Paper Session 18. Cardiac**
Moderator: Angela L. Jefferson
West Side Ballroom Salon 2

1.	UYSAL, S	Optimizing Cerebral Oxygenation In Cardiac Surgery: Neurocognitive Outcomes

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2. MOORE, EE — Lower Cardiac Output is Associated with Smaller Regional Gray Matter Volumes Among Cognitively Normal Older Adults: The Vanderbilt Memory & Aging Project
3. DO, R — Lower Cardiac Output Relates to Longitudinal Cognitive Decline: The Vanderbilt Memory & Aging Project
4. KRESGE, HA — Subclinical Compromise in Cardiac Contractility Relates to Smaller Cerebral Gray Matter Volumes
5. BOWN, C — APOE Genotype Modifies the Cross-Sectional Association Between Cardiac Output and Cognition

9:00–10:30 AM — **Paper Session 19. Memory & Executive Functioning**
Moderator: Steve Guy
West Side Ballroom Salon 3

1. STIVER, J — Variable Sleep Quality Predicts Poorer Spatial Learning and Memory
2. BILDER, RM — Working Memory Across Levels of Analysis
3. GICAS, K — Risk Factors for Longitudinal Change in Memory Functioning Among Homeless and Marginally Housed Persons
4. HO, BD — Neurofibrillary Tangle Burden in the Dorsolateral Frontal Cortex is Associated with Processing Speed Impairment: A Digital Neuropathological Analysis from the Framingham Heart Study
5. GETTENS, K — The Role of Executive Function in Weight Management: Predicting Weight Loss Maintenance Outcomes in a Behavioral Weight Loss Intervention
6. BECK, A — Longitudinal Associations Between Subjective Memory, Objective Memory, and Hippocampal Volume: A Twin Study

9:00–10:30 AM — **Paper Session 20. Depression & Anxiety**
Moderator: Shawn McClintock
West Side Ballroom Salon 4

1. YEUNG, RC — Altered Working Memory Capacity for Social Threat Words in High versus Low Social Anxiety
2. VENEZIA, R — The Impact of Cognitive Reserve on Neurocognitive Performance in Major Depressive Disorder
3. BARBEE, N — Ethnic Density: Relationship Between Segregation in Primary Schooling and Late Life Depression in African Americans
4. MANNING, K — Regression Based Change Approach to Understanding Cognitive Decline in Late-Life Depression
5. MELROSE, R — Neuroradiological Biomarkers of Dementia in Post-Traumatic Stress Disorder
6. GUJRAL, S — The Protective Effects of Physical Activity on Cognitive Decline and Depression in Older Adults with Mild Cognitive Impairment and Comorbid Depressive Symptoms

9:00–10:30 AM — **Symposium 14. Computerized Tools for Cognitive Assessment**
Chair: Darlene P. Floden
Discussant: Russell Bauer
Presenters: David Sabsevitz, Richard Gershon, Stephen Rao, Robyn M. Busch, Katherine L. Possin
West Side Ballroom Salon 1

1. FLODEN, DP — Computerized Tools for Cognitive Assessment
2. SABSEVITZ, DS — NeuroMapper Testing Platform: Using Technology for Surgical Mapping
3. GERSHON, R — A Practical Approach to the Detection of Cognitive Impairment and Dementia in Diverse Primary Care Settings: The MyCog Paradigm
4. RAO, S — Identification of Preclinical and Prodromal Alzheimer's Disease Using the Cleveland Clinic Cognitive Battery (C3B) in a Primary Care Setting
5. BUSCH, RM — The Brief Assessment of Cognitive Health (BACH): An Automated Tool to Detect Cognitive Impairment in Adults
6. POSSIN, KL — The UCSF Brain Health Assessment for the Detection of Cognitive Impairment, Including Dementia, in Primary Care

10:30–10:45 AM — **AM Coffee Break Sponsored by Kessler Foundation**
Broadway Ballrooms South

10:45 AM–12:00 PM — **Poster Session 10. Imaging, Neuroscience, & Cross-Cultural**
Broadway Ballroom South and Majestic Complex

Cognitive Neuroscience

1. BALASUBRAMANIAN, S — Exploring the Relationship Between Olfaction and Cognition in Diverse Middle-Aged Adults
2. BURNS, AI — The Association Between Monrningness-Eveningness and Nightmares in PTSD
3. GARCIA-EGAN, PM — Early Life Stress and Sex Interactions on Self-ratings of Prospective and Retrospective Memory in Healthy Adults: A Pilot Study

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Inclusion and Diversity/Multiculturalism

Neuroimaging

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47. GAROLERA, M — Differences in brain's structural networks linked to body-weight status
48. GLAZER, S — Depression in Pediatric Brain Tumor Survivors: An Analysis of White Matter Integrity of the Uncinate Fasciculus Using Diffusion Tensor Imaging
49. GUZMAN, HF — Associations Among White Matter Integrity in the Inferior Longitudinal Fasciculus, Executive Function, and Processing Speed in Pediatric Brain Tumor Survivors
50. HAGERDORN, P — White matter integrity in the cingulum bundle and its association with executive functioning and peer acceptance in pediatric brain tumor survivors
51. IGWE, K — Neurometabolic Correlates of White Matter Hyperintensities and Cognition in Middle-Aged Adults
52. JONES, P — Associations Between Amygdala Nuclei Volumes and Social Network Size in Homeless and Marginally Housed Persons
53. KAIVER, CM — Binge Drinking Impacts Prefrontal Gyrification Index in Adolescents and Young Adults
54. KAPLAN, N — Quality Assessment of Freesurfer Segmentation Conducted on Clinical 3T MRI Scans
55. KILLGORE, W — Vulnerability and Resistance to Sleep Deprivation are Associated with Measureable Differences in Brainstem Gray Matter
56. LACOMBE-BARRIOS, J — Non-Sedated Structural MRI in Young Children with TBI: Preliminary Feasibility Results
57. LOISELLE, C — Functional connectivity differences in young children with and without social concerns
58. MACKAY-BRANDT, A — The Nathan Kline - Rockland Sample: An Open-Science Data Sharing Resource
59. O'GRADY, C — Visual and auditory functional MRI (fMRI) language paradigms: Concuerrent validity, robustness, and role in pre-surgical determination of language dominance
60. RHOADS, T — Neuroanatomy of Auditory Hallucinations and Implications for Severity in Psychotic-Spectrum Illnesses
61. STEBBINS, L — Post-Traumatic Stress Disorder Alterations in Brain Activity Measured by a Single Photon Emission Computed Tomography Imaging
62. TAHMI, M — Heterogeneity of β-Amyloid Distribution in the Human Brain
63. TANNER, JJ — Ethnic and Sociodemographic Group Differences in Non-Frontal Brain Regions
64. WATERS, A — White Matter Connectometry Among Individuals with Self-Reported Family History of Drug and Alcohol Use Disorders
65. WATERS, A — Resting-state Connectivity Between Striatal and Neurocognitive Networks: Associations with Social Cognition and Executive Functions
66. WILLIAMS, J — The Development of Semantic Knowledge Indicated by Patterns of Diffusion Tensor Imaging

Neurophysiology/EEG/ERP

67. AGATE, T — Electrophysiological Markers of Reward Processing in Athletes: Do Sports Expertise and Exercise Play a Role?
68. BREZOVAR, S — Impact of high altitude exposure on early visual processing
69. GUAY, S — Neurophysiological substrates of emotional treatment during a dynamic emotional facial expression task: An attempt to objectively measure empathy in young and aging adults
70. HENNIG, N — Heart Rate Variability and Spirituality as Factors of Resilience in Humanitarian Aid Workers
71. HOLLAND, K — Changes in Right Temporoparietal Activation in Women with High and Low Levels of Trait Rumination: Examining the Influence of Arousal Level on Visuospatial Task Performance
72. LEE, K — Predictive Effects of Performance Monitoring on Obsessive-Compulsive Symptomatology in Children
73. MCKINNEY, TL — Mindfulness and aerobic physical activity promote sustained attention and reduced neural correlates of mind-wandering
74. MCKINNEY, TL — Novelty effects: Personality trait or indicator of cognitive dysfunction?
75. REYNOLDS, J — Neurophysiological Indicators of Changes in Right Hemisphere Activation in Response to Changes in Arousal Level and Cognitive Stress
76. SCAVONE, A — Mindfulness and Skin Conductance Response
77. SHELDON, S — Exploring Relations Between Neurophysiological Latency and Processing Speed: A Visual Evoked Potential Study
78. VELEZ-URIBE, I — Emotion Word Processing in English Monolinguals and Spanish-English Bilinguals: An ERP Study
79. ZURLINDEN, T — The Correlation Between Middle Alpha Power and Pain Ratings

10:45 AM–12:15 PM

Symposium 15. New Horizons in Cognitive Rehabilitation
Chair and Presenter: John DeLuca
Presenters: Nancy D. Chiaravalloti, Natalia Ojeda del Pozo, Benjamin Hampstead
Broadway Ballroom North and Shubert Complex

1. DELUCA, J — New Horizon's in Cognitive Rehabilitation
2. DELUCA, J — Cognitive Rehabilitation in Multiple Sclerosis
3. CHIARAVALLOTI, ND — New Advances in Cognitive Rehabilitation in TBI
4. OJEDA DEL POZO, N — Cognitive Rehabilitation for Persons with Schizophrenia
5. HAMPSTEAD, B — Cognitive Rehabilitation in Neurodegenerative Diseases

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10:45 AM–12:15 PM **Paper Session 21. Mild Cognitive Impairment**
Moderator: Thomas J. Farrer
West Side Ballroom Salon 1

1.	ROBERTSON, KK	The Importance of Two Timepoints: Dementia Incidence Associated with Mild Cognitive Impairment (MCI) in a Community-Based Sample
2.	KREMEN, WS	Episodic Memory and Semantic Fluency Predict 6-Year Progression to MCI in Cognitively Normal Middle-Aged Adults
3.	MURPHY, KJ	Addressing and Treating Real-life Memory Problems in Mild Cognitive Impairment
4.	LOCKE, D	Comparison of Behavioral Interventions for Patients with Mild Cognitive Impairment: Impact on Loved One Partner Outcomes
5.	HACKETT, K	Sources of Bias in Informant-Rated Everyday Functioning in Mild Cognitive Impairment
6.	EDMONDS, EC	Patterns of Longitudinal Cortical Atrophy in Empirically-Derived MCI Subtypes

10:45 AM–12:15 PM **Paper Session 22. Pediatric Epilepsy & Other Pediatric Medical**
Moderator: Dalin T. Pulsipher
West Side Ballroom Salon 2

1.	BREMM, FJ	Pre- and Postoperative Verbal Memory and Executive Functioning in Frontal Lobe Epilepsy Versus Temporal Lobe Epilepsy
2.	MACALLISTER, WS	Psychological Functioning among Pediatric Patients with Left vs Right Hemisphere Epilepsy
3.	LOBLEIN, HJ	Anxiety in Pediatric Epilepsy: The Interaction Between Stigma and Seizure Severity
4.	MONTPETIT, C	Psychological Functioning and Behavioral Concerns in Children with ESES
5.	MRAKOTSKY, C	Immune Gene Expression, Brain Structure, and Neuropsychological Function in Pediatric Crohn's Disease
6.	JALAL, R	Neurocognitive Profile of Social Skills Impairment in Individuals with 22q11.2 Mutations

10:45 AM–12:15 PM **Paper Session 23. Assessment**
Moderator: Brigid Waldron-Perrine
West Side Ballroom Salon 4

1.	RIVERA, D	Examining the impact of the violation of normality assumptions via a Bayesian graphical model
2.	DEVAUGHN, S	Rethinking Delays: 1 Week Recall Predicts Medial Temporal Lobe Volume Decline in Healthy Older Adults
3.	KENNEY, L	The Screening Utility and Ecological Validity of the Neuropsychological Assessment Battery Bill Pay Subtest in Older Adults With and Without Dementia
4.	IKANGA, JN	Prediction of the Performance on a new Battery for the Assessment of Cognitive Function in Sub-Saharan Africa
5.	MACPHERSON, SE	The Cognitive Estimation Test: Bizarreness and Frontal Executive Dysfunction in Neurological Patients

10:45 AM–12:15 PM **Symposium 16. Prospects in the Development of Neuropsychology: Perspectives From FiveDifferent Continents-**
Chair and Presenter: Alberto L. Fernandez
Presenters: Skye McDonald, Aparna Dutt, Sharon Truter, Jonathan Evans
West Side Ballroom Salon 3

1.	FERNANDEZ, AL	Prospects in the Development of Neuropsychology: Perspectives from Five Different Continents - International Liaison Committee Sponsored Symposium
2.	MCDONALD, S	Prospects in The Development of Neuropsychology: Perspectives From Oceania
3.	DUTT, A	An Open and Honest Appraisal for Future Growth of Clinical Neuropsychology Practice and Training in India and Other Asian Countries
4.	TRUTER, S	Exploring the Development of Neuropsychology in Africa through an Investigation into the Application of Neuropsychological Tests in Africa
5.	EVANS, J	Prospects for the Development of Neuropsychology: Perspectives From Europe
6.	FERNANDEZ, AL	Past, Present and Future of Neuropsychology in Latin America

12:15–1:15 PM **Plenary G (Kaplan Memorial Lecture) Into the Gray Zone: Assessing Residual Cognitive Function in Disorders of Consciousness**
Presenter: Adrian M. Owen
Broadway Ballroom North and Shubert Complex

1.	OWEN, AM	Into the Gray Zone: Assessing Residual Cognitive Function in Disorders of Consciousness

1:15–2:15 PM **Kaplan Lecture Luncheon**
West Side Ballroom Salon 3

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Abstracts Presented at the Forty Seventh Annual Meeting International Neuropsychological Society

February 20-23, 2019
New York, NY, USA

WEDNESDAY MORNING, FEBRUARY 20, 2019

CE Workshop 1. The Use of Neuroimaging and Computational Approaches to Inform Interventions for Mood Disorders

Presenter: Faith Gunning

9:00 a.m.–12:00 p.m.

F. GUNNING. The Use of Neuroimaging and Computational Approaches to Inform Interventions for Mood Disorders.
Advances in neuroimaging methods and computational approaches provide an unprecedented opportunity to advance our understanding of the role of specific brain networks involved in the expression and course of mood and disorders. In addition, these sophisticated neuroscience approaches can provide distinct targets for novel interventions for cognitive and affective symptoms. This session will present the results of state-of-the-art neuroimaging and computational approaches that are being used to better understand the neurobiological underpinnings of mood and disorders. Examples will be provided, including a novel computational approach that is reliant on machine learning of resting state fMRI scans to successfully classify individuals into neurobiologically-defined subtypes of depression. In addition, the promise and current limitations of such approaches for informing treatment development and matching patients to treatments will be presented. The session will conclude with examples of interventions that are designed to target specific brain network dysfunctions to improve symptoms of mood disorders. At the end of the session, attendees will be able to do the following: 1. Discuss evidence for current computational neuroimaging-based approaches to identifying subtypes of mood disorders: 2. Critically evaluate efficacy of current subtype-guided treatments; 3. Consider and discuss promising future directions for the use of neuroimaging and computationally based approaches for treatment development and selection for individuals suffering from mood disorders.
Correspondence: *Faith Gunning, PhD, Psychiatry, Weill Cornell Medicine, 525 E 68th St, New York, NY 10065, United States. E-mail: fgd2002@med.cornell.edu*

CE Workshop 2. Cognitive Control Dysfunction and Rehabilitation: Major Theories and Component Process Dysfunction in Traumatic Brain Injury and Psychopathology

Presenter: Michael J. Larson

9:00 a.m.–12:00 p.m.

M.J. LARSON. Cognitive Control Dysfunction and Rehabilitation: Major Theories and Component Process Dysfunction in Traumatic Brain Injury and Psychopathology.
Cognitive control theories suggest dissociable, but interacting, component processes necessary for goal-directed behaviors, emotional regulation, and environment- and performance-monitoring. Neuroanatomically, cognitive control functions are often represented by a dynamic interchange between areas of the medial and pre-frontal cortices, though the specificity of such neuroanatomical distinctions is challenged. Cognitive control dysfunction is a frequent symptom of psychiatric and neurologic illness or injury and often manifests as behavioral impulsivity and failure to accurately perceive and monitor the self- and environment. This course will focus on young- to mid-life adulthood and will first review basic research findings and theories of cognitive control and the controversy in identification of component process functions and anatomical correlates. Second, the course will cover the behavioral manifestations and implications of cognitive control component process dysfunction across a range of psychiatric and neurologic conditions—including case examples and focusing on the dissociation of component process dysfunction and awareness across the range of traumatic brain injury (TBI) severity. Third, the course will cover rehabilitation of cognitive control processes, with an emphasis on a biopsychosocial model of treatment including exercise and behavioral strategies for rehabilitation in people with TBI and psychiatric illness. The course learning objectives are designed to help you: (1) compare the major theories of cognitive control and identify the neuroanatomical correlates of specific cognitive control component processes; (2) identify the primary symptoms of cognitive control component process dysfunction following TBI and in people with psychopathology; (3) explain evidence-based rehabilitation treatments for people experiencing cognitive control dysfunction.
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CE Workshop 3. If Only I had a Crystal Ball: The Role of Functional Neuroimaging in Predicting Future Cognitive Function in Children with Epilepsy

Presenter: Amanda Wood

9:00 a.m.–12:00 p.m.

A. WOOD. If Only I had a Crystal Ball: The Role of Functional Neuroimaging in Predicting Future Cognitive Function in Children with Epilepsy.

Advances in neuroimaging techniques have offered unique insights in to the onset and course of many neurological conditions. Functional imaging tools such as functional magnetic resonance imaging (fMRI) or magnetoencephalography (MEG) enable us to visualize brain activity *in vivo* and may therefore prove useful in clinical practice. In particular, much hope was held that they might replace more invasive techniques or even the need for clinical evaluation in people undergoing resection of eloquent cortex. This is particularly attractive in the paediatric setting, where tolerance of painful or lengthy procedures is low. Neuropsychological assessment has been a mainstay of presurgical evaluation of hemispheric dominance and localization of functions for adults with epilepsy. In this course, we will first review the neuropsychological characteristics associated with epilepsy in childhood that warrants surgical intervention. Reference will be made to adult models and particular emphasis given to evaluation of risk to eloquent cortex. We will then review basic principles of functional neuroimaging techniques and how they are applied to clinical decision making. The evidence for clinical utility of fMRI and MEG in children with refractory seizures will be presented, prior to a discussion of future directions for imaging predictors of later neuropsychological function.

Learning Objectives: Course attendees will be able to: 1) Describe the underlying basis of signals generated functional neuroimaging techniques and the principles of paradigm design and analysis relevant to children, 2) Describe typical neuropsychological presentations in children and adults with refractory epilepsy requiring resection of eloquent cortex 3) Discuss the benefits and limitations of fMRI and MEG to predict postoperative neuropsychological function, 4) summarise key developments in imaging analysis that might impact on decision making in the neuropsychology clinic.

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WEDNESDAY AFTERNOON, FEBRUARY 20, 2019

Lunch (On Own)

12:00–1:00 p.m.

INS Business Meeting

12:00–1:00 p.m.

CE Workshop 4. Contextually Valid Executive Assessment (ConVExA): A New Approach to Addressing Ecological Validity in Assessment of Executive Functions

Presenter: Yana Suchy

1:00–4:00 p.m.

Y. SUCHY. Contextually Valid Executive Assessment (ConVExA): A New Approach to Addressing Ecological Validity in Assessment of Executive Functions.

Despite extensive evidence that the domain of executive functioning (EF) represents the strongest predictor of daily functioning, tests of EF have long been criticized as having poor ecological validity. During the first half of this workshop, empirical evidence for and against ecological validity of EF tests will be reviewed and common sources of error in making functional predictions will be identified. Recommendations for improving both research and clinical utility of EF tests toward valid functional predictions will be offered. The second half of the workshop will introduce the Contextually Valid Executive Assessment (ConVExA) model, which proposes that the association between EF and daily functioning is both mediated and moderated by a variety of contextual factors, including acute and fluctuating factors such as pain, sleep quality, emotion regulation demands, and life complexity, as well as stable factors such as personality and cognitive reserve. Existing empirical supports for the model will be reviewed, and the first steps toward the application of the ConVExA model in research and clinical practice will be offered.

By the end of the workshop, participants will be able to

1. Summarize the evidence for and against ecological validity of EF tests
2. Name the sources of error in functional predictions and explain how to address them in research and clinical practice
3. Explain the premise of the ConVExA model and its theoretical and clinical contributions to making valid functional predictions

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CE Workshop 5. Mapping Cognition Along the Continuum of Alzheimer's Disease: Towards Novel Assessments, Affordable Biomarkers, and Technology-Driven Interventions

Presenter: Mario A. Parra

1:00–4:00 p.m.

M.A. PARRA. Mapping Cognition Along the Continuum of Alzheimer's Disease: Towards Novel Assessments, Affordable Biomarkers, and Technology-Driven Interventions.

Current approaches to battle Alzheimer's Disease (AD) focus on (1) detecting the disease earlier, (2) slowing decline or enhancing memory, and (3) retaining quality of life. Recent guidelines and consensuses draw our attention towards the preclinical stages where current assessments and interventions strategies are not yet meeting the needs. This workshop will discuss recent evidence highlighting the need of a paradigm shift in the early detection of memory impairments in people at risk of AD. Basic and clinical research that have led to the identification of structures within and outside the medial temporal lobe that are critical for low-level memory functions compromised in AD in the preclinical stages will be reviewed. Hypotheses on how such functions can be reliably assessed will be considered in the light of challenges faced by a globalized world (i.e., ageing, literacy and diversity). Second, current

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research will be discussed that is aimed at understanding how assessment of such cognitive functions can be combined with neuroscience methods aimed at gathering biological evidence to yield affordable cognitive biomarkers of AD. The impact that such biomarkers can have on the Global Dementia Challenge will be highlighted. Third, the workshop will cover new translational research that involves the incorporation of novel theories of cognitive decline in AD for use in technology driven interventions that follow ethnographic and person-centered approaches. As a result of participation in this workshop, the learner will achieve the following objectives: (1) an updated explanation of the neuroanatomy of memory decline in AD, (2) be able to appraise and design novel forms of culturally valid assessment, and (3) utilize this information to discuss, plan, and implement technology driven interventions within the context of interdisciplinary research.

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CE Workshop 6. Social Communication: Awkward to Assess and Treat, Critical for Successful Long-Term Outcome

Presenter: Lyn Turkstra

1:00–4:00 p.m.

L. TURKSTRA. Social Communication: Awkward to Assess and Treat, Critical for Successful Long-Term Outcome.

Social impairments are a common, chronic, and costly problem for many individuals with traumatic brain injury (TBI) and a major cause of stress and burden for caregivers. These impairments are most evident in everyday communication interactions, limiting employment, social participation, and quality of life. The explosion of research on social cognition in typical and clinical populations has advanced general knowledge about social communication, including its neuropsychological and neurological underpinnings, but results are not always easily translatable into clinical practice.

This workshop's learning objectives are designed to help you 1) describe current research on social cognition and communication in typical populations and individuals with TBI and critique its potential application to clinical assessment and intervention; 2) recite evidence that factors such as culture, race, sex, and age affect social communication, and identify principles that apply across groups. Additionally, participants will 3) assess their own social communication skills and generate strategies to minimize examiner bias in assessment and intervention. Finally, 4) we will discuss how results from TBI research apply across populations with social communication impairments, including individuals with social (pragmatic) communication disorder and autism spectrum disorder.

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INS Student Liaison Committee Workshop: Feedback that Sticks: The Art of Communicating in the Language of our Patients

Presenter: Karen Postal

2:30–4:00 p.m.

Poster Session 1. Aging

2:30–3:45 p.m.

Aging

M.C. ACEVEDO-MOLINA, A.C. ROBERTSON, M. TEPOSTE & M. GRILLI. Cognitively Normal Older Adults Show Elevated Semantic Detail Generation for Multiple Forms of Autobiographical Memory Retrieval.

Objective: In comparison to young adults, cognitively normal older adults generate more semantic details during episodic autobiographical memory retrieval. However, it remains unclear whether this age-related difference persists when the demands of autobiographical memory retrieval promote the generation of semantic details in a more elaborative way. To address this gap in knowledge, we developed a novel "life chapter" task that involved elaborative autobiographical memory retrieval of semantic detail.

Participants and Methods: Twenty young and twenty cognitively normal older adults were asked to orally describe remote and recent life chapters in as much detail as possible. Participants were also asked to describe remote and recent episodic autobiographical memories. For both autobiographical tasks, semantic and episodic detail generation was scored using the standard protocol from the Autobiographical Interview (AI; Levine et al., 2002).

Results: In comparison to young adults, older adults generated more detail overall when describing remote and recent life chapters. This was largely driven by their generation of personal and general semantic details, relative to episodic detail. Similar to prior research, in comparison to young adults, older adults also generated more semantic detail accompanied by less episodic detail when recollecting episodic autobiographical memories.

Conclusions: These findings indicate that the elevated generation of semantic details associated with normal aging is present when autobiographical narratives are episodic or semantic in orientation. We suggest that older adults' elevated use of semantic detail during autobiographical memory retrieval may reflect a difference in narrative style and communication goals, as opposed to deficient episodic detail alone.

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H.L. APOSTOLOU, A.B. ZAHEED, N. SHARIFIAN, A.Z. KRAAL, K. SOL & L.B. ZAHODNE. Longitudinal Associations Between Social Relations and Cognitive Aging.

Objective: Social relations may provide protective resources for cognitive aging. Prior cross-sectional analyses in the Survey of Midlife in the United States (MIDUS) found that different aspects of social relations (i.e., social support, social strain, and contact frequency) are independently associated with cognition, and these relationships are moderated by age. The impact of social relations, however, may differ depending on the source (i.e., partners, other family, and friends). The goals of this study were to extend this work to a longitudinal framework and investigate which relationship types drive prospective associations.

Participants and Methods: Longitudinal associations between social relations and cognition were examined in 1,808 MIDUS participants (mean age=55). Linear regressions estimated associations between baseline social relations and composite scores of episodic memory and executive functioning 7-9 years later, controlling for baseline cognition, sociodemographics, chronic diseases, and depressive symptoms.

Results: Independent of age, more spousal support and less spousal strain at baseline were associated with better episodic memory at follow-up. Age moderated the impact of social support from friends

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such that friend support at baseline was only associated with better subsequent episodic memory at older ages. In addition, more frequent contact with friends at baseline was only associated with better subsequent executive functioning at older ages.
Conclusions: Marriage quality may be important for cognition across the adult life course, while both quality and quantity of interactions with friends may help to maintain cognitive health in late life. Differential patterns of associations between quality versus quantity of social relations and cognitive domains may reflect different mechanisms (e.g., stress buffering versus mental stimulation). These results can inform the design of social interventions to prevent cognitive morbidity among older adults.
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F. ARIAS, L. HIZEL, K. RODRIGUEZ & C. PRICE. Exploratory Factor Structure of the Digestive Health Questionnaire.
Objective: Digestive health refers to our body's ability to breakdown and absorb nutrients to provide energy, foster growth, facilitate immune function, and promote wellbeing. While digestive complaints are common in medicine, they are seldom assessed. In the context of the neuropsychological evaluation, assessment of digestive health is not systematic and exclusively measured when specific pathologies are suspected. First, we examined the factor structure of a brief, clinically-derived, scale of gastrointestinal symptoms. Finally, we assessed the association between cognitive functioning and digestive symptoms in a sample of community-dwelling adults.
Participants and Methods: This study included 108 older adults with no dementia or stroke histories (age: 69.32 yrs±6.39; education: 16.3±2.66) enrolled in two longitudinal studies at UF Health Shands. This cross-sectional analyses included data collected at a single time point. An exploratory factor analyses (EFA) was conducted using principal axis factor with promax rotation to analyze the underlying associations between 20 digestive symptoms. Final model selection was based on factor loadings.
Results: The Kaiser-Meyer-Olkin (KMO) measure was .79, and in the "good" range. Barlett's test of sphericity $X^2(190) = 726.72$, p, .001 indicated that correlations between items were appropriate to support EFA. The scree plot suggested that 4-5 factors should be selected. EFA produced a 4-factor model and all variables loaded on the factors at a predefined threshold (0.40). Variables loaded on 4 domains: agility, nutrient absorption, stamina, and mobility.
Conclusions: Identifying a reliable and rapid digestive health instrument may have important implications in clinical care, helping to identify modifiable risk-factors, and advance research on the brain-gut-axis. Our findings are consistent with the literature on Parkinson's Disease, suggesting different phenotypes for digestive health.
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N. BANERJEE, M. SLUGH, S. KAUR, N. SUN-SUSLOW, K. MCINERNEY, M. SARNO, M. MIRANDA, T. RUNDEK & B. LEVIN. Neuropsychological Correlates of Subjective Fatigue in Aging Adults.
Objective: To examine the neuropsychological correlates of subjective fatigue in a group of non-demented middle-aged and older community-dwelling adults.
Participants and Methods: 167 non-demented men and women (age range: 50-91) were recruited from University of Miami clinics and the surrounding community. Participants completed the fatigue symptom inventory (FSI), a comprehensive neuropsychological test battery, and a frailty assessment. Six cognitive composite scores (i.e., attention/information processing, executive functioning, learning, memory, language, and psychomotor speed/dexterity) were computed by averaging normative scores (T-scores).
Results: Linear regression analyses showed that higher levels of fatigue were associated with poorer attention/information processing, executive function, and psychomotor speed/dexterity. These associations remained significant even when controlling for depression, poor sleep quality, and grip-strength. Participants endorsing moderate-severe fatigue faced higher odds ($OR = 7.67$, 95% CI = 1.30, 45.40) of exhibiting attention/information processing impairments than those reporting minimal fatigue.
Conclusions: These findings add to a limited body of literature linking higher levels of subjective fatigue with neurocognitive functioning in middle-aged and older adults. These findings were independent of depression, poor sleep, and weakness, highlighting fatigue as a unique construct with clinical relevance to cognition. Moreover, our findings suggest that subjective fatigue is associated with a distinct pattern of cognitive deficits involving domains largely subserved by frontal-subcortical and frontoparietal circuits. Future studies should examine the impact of interventions targeting fatigue on brain health.
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C. BARBA, A. DÁVILA-ROMAN, R. ANDEL & M. CROWE. Early-Life Infectious Disease and Risk of Incident Cognitive Impairment in a Population-Based Sample of Older Adults in Puerto Rico.
Objective: Exposure to early-life viruses has been linked to greater risk of cardiovascular disease in adulthood but there has been little research on the potential association with risk of cognitive impairment or dementia. We investigated whether viral infectious diseases in childhood were positively associated with cognitive impairment in older adulthood, hypothesizing that this relationship would be explained by higher cardiovascular disease.
Participants and Methods: Participants included 3,591 community-dwelling older adults aged 60+ years from the Puerto Rican Elderly: Health Conditions (PREHCO) Study without cognitive impairment at baseline. Participants reported history of 11 infectious viral diseases in childhood (typhus fever, hepatitis, tuberculosis, rheumatic fever, polio, malaria, dengue, measles, chickenpox, mumps, and smallpox), which were coded as "low" (0-1 diseases), "moderate" (2-3), or "high" (4+) groups. Cognitive impairment was determined at baseline and four-year follow-up using regression-based cutoffs 1.5 SD below expected score on a previously validated 20-item Spanish language dementia screening measure, the minimental Cabán (MMC). Covariate-adjusted logistic and linear regression models were utilized in analyses.
Results: Compared to participants with low viral exposure, those with high exposure were more likely to have cardiovascular disease but not incident cognitive impairment. Moderate exposure to childhood illness was associated with lower risk of cognitive impairment compared to low exposure (OR = 0.634; 95% CI = 0.436, 0.921, p<.05).
Conclusions: Contrary to our hypothesis, moderate exposure to childhood infectious diseases was associated with reduced risk of cognitive impairment in late adulthood, despite a positive association between childhood virus exposure and cardiovascular disease. These findings suggest differential effects of early-life illness on cognitive and cardiovascular outcomes, although survival bias is a potential confound that we cannot rule out.
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C. BEAULIEU, V. L. BLANCHETTE, F. CARRIER-TOUTANT, B. BRISSON, F. D'HONDT & L. DE BEAUMONT. Age-Related differences in negativity bias to emotional facial expressions : An Event-Related Potential (ERP) study.

Objective: Studies have shown age-related differences in the processing of emotional information. While younger adults tend to pay more attention to negative information, older adults are known to exhibit an attenuation of this negativity bias. The late positive potential (LPP) is a component of the event-related brain potential strongly modulated by the emotional properties of a stimulus. Therefore, the latter component represents an unexplored, pertinent neurophysiological measure of the negativity bias. The purpose of the present study is to determine whether older adults exhibit an attenuation of the negativity bias, as indexed by the LPP amplitude, during the identification of emotional facial expressions.

Participants and Methods: Fifty-seven adults (28 young, 29 old) completed a computerized Emotional Facial Expression (EFE) identification task during which continuous EEG activity was recorded. LPP amplitude was measured for each of three emotional facial expressions (EFE) (neutral/happy/angry). The negativity bias was measured as the difference in mean LPP amplitude recorded for angry EFE and for happy EFE.

Results: A 2 x 3 ANOVA revealed a significant group (young/old) by EFE (neutral/happy/angry) interaction on LPP amplitude ($F_{2, 55} = 3.929$; $p = 0.025$). A priori follow-up analyses showed that in younger adults, LPP amplitude was significantly larger for angry EFE compared to happy EFE ($t_{1, 27} = -6.192$; $p < 0.001$). However, in older adults, no significant difference was found between LPP amplitude elicited by angry and happy EFE ($t_{1, 28} = -1.718$; $p = 0.097$). Older adults showed a significantly smaller negativity bias ($t_{2, 55} = -2.904$; $p = 0.005$) relative to younger adults.

Conclusions: Results from the present study show age-related changes in the neurophysiological processes of emotional facial expressions and support the notion of an attenuation of the negativity bias in aging.

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R.T. ÁVILA, L. BERTOLA, M.G. CINTRA, M.V. COSTA, L.R. PIRES, A.A. LAGE, I.M. FREITAS & M.C. BICALHO. Cognitive stability predictors differ between older adults with normal cognition and Mild Cognitive Impairment.

Objective: Low education is a risk factor for a rapid cognitive decline. This study aimed to investigate the factors that confer resilience to cognitive stability within diagnostic groups with low education.

Participants and Methods: 78 initially non-demented (30 cognitively normal – CN; 48 Mild Cognitive Impairment - MCI) low educated Brazilian older adults from a longitudinal cohort, selected based on their stability diagnosis inside the CN and MCI groups. Trajectory of general cognition, memory, executive function, language and visuoconstruction were built on composite scores. Initial cognitive performance and the rate of cognitive change were estimated using up to three assessments. We performed a multiple-group Latent Growth Model to identify the baseline and rate of cognitive change predictors across the groups. Age, education, intelligence and depressive symptoms were selected as predictors.

Results: Predictors of all cognitive trajectories differed significantly across diagnostic groups. Specific predictors of initial cognitive performance and rate of change differ across the groups and cognitive measures. For the MCI group higher age was associated with faster decline on executive function and visuoconstruction. Better intelligence showed distinct patterns acting as predictors of faster decline on general cognition and executive functions, but protector for visuoconstruction. For the CN group higher age was associated worse general cognition rate of change. Better intelligence acted as a predictor for a faster decline on executive function and visuoconstruction.

Conclusions: CN and MCI older adults, even showing cognitive stability, do no use the same predictors to cognitive performance between groups and cognitive domains. Older adults with low education attainment do not use the same traditional predictors for cognitive stability across the cognitive domains. Specific predictors should be analyzed across diagnostic to develop models that reflect the protectors' factors necessity across groups and cognitive domains.

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A.R. BOEVE, R. MACAULAY, A. HALPIN, P. EDELMAN & N. SPRANGERS. Music as a Cognitive Intervention in Older Adults.

Objective: Developing cognitive interventions that might prevent or delay cognitive decline is critical given the rapidly growing aging population and anticipated increase in dementia prevalence. Research suggests that playing a musical instrument associates with better working memory, attention, and executive function performance in older adults. However, these findings are primarily based on correlational research investigating differences in cognitive performance between musicians and non-musicians. The Maine Understanding Sensory Integration & Cognition (MUSIC) Project investigated whether learning to play a recorder associated with improvements in cognitive performance in music naive older adults.

Participants and Methods: MUSIC provides 12-weekly one-hour instructor led music recorder group lessons. 31 older adults ($M_{age} = 70$) with a range of cognitive function (MoCA range=19-29, Med=26, SD=2.36) were evaluated before and after the intervention. Composite scores for Executive Attention, Episodic Memory, Verbal Fluency, Visual Memory, and Working Memory were formed using the National Alzheimer's Disease Coordinating Center's neuropsychological test battery.

Results: Wilcoxon Signed-Ranks Tests indicated that global cognition, verbal fluency, and visual memory scores were significantly higher at post-intervention than pre-intervention, p's < .05. Repeated measure ANOVAs revealed a trend in improvement on working memory, p = .093, but no significant improvement in episodic memory, p > .05. Executive attention scores on average improved once education was adjusted for as a covariate in the model.

Conclusions: Preliminary findings found improvements on measures of executive attention, verbal fluency, visual memory, and global cognition. These results indicate that the MUSIC project's affordable group music intervention may provide a fun and efficient method to enhance cognitive function in older adults. Future research intends to utilize an active control group for comparison.

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T.L. BRAGG, K. WALL, G.D. BIEN & J.H. ORY. Applying a Conceptual Model of Capacity Assessment.

Objective: Often ambiguous legal jurisprudence stipulating capacity makes assessing capacity complex. This case study demonstrates the use of a cross-jurisdictional model to show the integration of clinical and legal components of capacity into a model supporting capacity assessment in court proceedings for guardianship in a geriatric patient.

Participants and Methods: A 98-year-old White male with 15 years of education was seen for assessment of financial, legal, and medical decisional capacity.

The six-domain conceptual model developed by Moye et al. (2007) was applied to this case to evaluate the patient's: functional disability due to medical conditions; cognition; everyday functioning; individual values, preferences, and patterns; risk of harm/level of supervision; and means to enhance capacity.

Results: Overall, his performance represented an apparent decline from premorbid functioning, resulting in a lack of decisional capacity, based on the Moye et. al. (2007) conceptual model. Risk of harm was deemed

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high due to poor insight and apathy, and 24/7 supervision was recommended to maintain safety. He also clearly expressed a value for leaving his money as a legacy to his children. This value should be considered in his care plan. Strategies recommended to enhance capacity involved inclusion in decision-making processes.
Conclusions: This conceptual model shows this patient lacks decision-making capacity. Despite his refusal to seek assistance, he requires assistance across all domains. This case shows that the Moye et. al. (2007) conceptual model for assessing capacity provides an excellent framework to ensure thorough consideration of multiple domains and issues involved in assessing decisional capacity.
References
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S. BROWN, M. CHEN, E. FRIEDRICH, S. YADAV, J. SINGH, A. JOSHI, M. RAPP & A. LLORENTE. Micronutrient Status and Cognition: A Longitudinal Geriatric Case Study.
Objective: Deficiencies of vitamins B1 and B6 have been linked to declines in overall aptitude and neuropsychological functioning. However, there is a lack of longitudinal research examining the trajectory of cognition in micronutrient status among older adults, leading to a call for protracted studies in this area. Consequently, this case study describes the longitudinal biological, electrophysiological, imaging, and neuropsychological effects of vitamin B1 and B6 deficiency in an older adult patient.
Participants and Methods: The patient, who initially presented to an inpatient medical unit, was a 64-year-old, married, female who had 14 years of education and worked as a homemaker. She completed EEG studies, imaging studies, and neuropsychological evaluations at 3 time points.
Results: Premorbid levels of functioning were calculated using the Barona Index, which suggested a premorbid full-scale IQ in the Average range. Scores revealed that the patient's attention, intelligence, immediate and delayed verbal memory, and executive functioning skills were impaired at Time 1. Additionally, an MRI revealed a small area of restricted diffusion in the left posterior parietal lobe compatible with small acute infarcts. At Time 2, significant increases across cognitive domains were observed, likely the result of treatment and other factors. By Time 3, the area of restricted diffusion had resolved; however, significant declines across cognitive domains were again present, indicating that the gains observed at Time 2 were transient. The significant cognitive decline from Time 2 to Time 3 was most likely the result of the long-term diminished levels of vitamins B1 and B6 and an insidious dementing state. EEG and brain perfusion tomography (DAT) data revealed unremarkable findings across time points.
Conclusions: Deficiencies in vitamins B1 and B6 are associated with longitudinal cognitive side-effects. The current findings are consistent with animal literature demonstrating the importance of vitamins B1 and B6 in cognitive functioning.
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A. CASTELLS-SÁNCHEZ, F. ROIG-COLL, N. LAMONJA, A. BERMUDO, M. ALZAMORA, G. PERA, A. HERAS, S. DOMÈNECH, P. TORÁN, K.I. ERICKSON & M. MATARÓ. Aerobic Fitness, a Key Factor of Cognitive Health in Adults and its Structural and Functional Brain Correlates.
Objective: Brain and cognitive changes are related to normal aging deterioration. Physical exercise has demonstrated to have a positive impact on cognitive and structural and functional brain health. Projecte Moviment is a wide project that aims to study the effects of physical and cognitive habits on health and its mechanisms. We report the neuropsychological differences found between high- and low-fit healthy adults and the neuroimaging correlates.
Participants and Methods: We recruited 20 healthy high-fit adults and we paired them with 40 healthy low-fit adults from Projecte Moviment trial sample. The final sample consisted in 60 participants without differences between gender (45% women), age (M=56.98, SD=0.652) and education (M=14.80, SD=0.643). A battery of neuropsychological tests were applied assessing 5 cognitive domains (memory, language, executive functions, attention - processing speed and visuospatial skills). Physical fitness was assessed with the One-Mile Rockport Walk Test to estimate the VO2max and the Minnesota Leisure Time Physical Activity Questionnaire. T1 and Resting State MRI sequences were obtained to evaluate structural and functional brain data.
Results: We found a significant effect of the group on the Executive ($F(1,55)=16.975$, $p<.001$), Attention-Speed ($F(1, 55)=9.342$, $p=.003$) and Language ($F(1, 55)=7.397$, $p=.009$) domains and in all the physical fitness measures after controlling for sex, age and education. Results showed statistically significant positive relationships between these domains and aerobic fitness (VO2max) and the amount of METS estimated in the Total and Sport Subscales of the Questionnaire but not with other types of daily activity. Potential structural and functional brain differences related to these results will be reported.
Conclusions: Results highlight the importance of aerobic fitness through sport, more than other activities, as a key factor to promote a healthy cognitive and brain aging.
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H. CHANG & M. HUA. Qualitative Analysis of Boundary Extension and Potential Compensatory Processes in Memory among Normal Elderly Individuals: A Preliminary Study.
Objective: Boundary extension (BE) refers to the tendency to overestimate the scope of a previously perceived scene, which may be related to the schematic processing of experiences. Previous research has revealed that aging enhances BE. Unfortunately, nearly all previous research on BE has examined the issue from a quantitative perspective, which may limit investigations into the mechanisms underlying BE. Furthermore, no previous study has examined the correlation between BE and cognitive functions.
Participants and Methods: Various qualitative indices were used to examine the effects of BE and the correlations with several domains of cognitive function, including tasks requiring different degrees of efforts to form meaningful associations. Analysis was conducted on cognitively healthy younger adults (20 to 59 years old) and older adults (older than 60 years old).
Results: Qualitative analysis of BE revealed that compared to younger adults, older individuals were unable to recall as many distinct features in the objects they observed. Differences in education, gender ratio, and neuropsychological functioning between the groups were insufficient to fully account for these results. The number of distinct features in the objects recalled by participants was negatively correlated with the quantitative BE effects, whereas the number of distinct features was positively correlated with performance on an auditory memory task requiring low effort to form meaningful associations.
Conclusions: Our preliminary findings revealed that enhanced BE among elderly individuals is associated with the attenuation of distinct features in their memories. The attenuation of features may act as a compensatory process in the face of increasing difficulty to form meaningful associations. Qualitative changes in BE might be useful in differentiating normal from pathological aging.
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M. CHEN, J.R. MAHONEY, F. FOLEY, M. IZZETOGLU & R. HOLTZER. Mediating effect of attention and executive functions on the relationships between subjective sleep quality and task performances during single- and dual-task gait among older adults.

Objective: Sleep complaints are common and linked to morbidity and functional decline among older adults. The role of sleep in dual-task gait, an attention-demanding walking paradigm that relies heavily on the prefrontal cortex (PFC), is not well understood. The current study aims to explore the mediating role of attention and executive functions (proxy for PFC functionality) on the relationships between subjective sleep parameters and task performances during single- and dual-task gait conditions.

Participants and Methods: A sample of 388 non-demented community-dwelling older adults (mean age in years = 76 ± 6.7) underwent three experimental conditions – normal walk, alpha (i.e., recite alternate letters of the alphabet), and walk while talk. Sleep was assessed using the Pittsburgh Sleep Quality Index (PSQI). Attention and executive functions were measured with a composite score among four neuropsychological tests: Controlled Oral Word Test, parts A and B of the Trail Making Test, and Digit Symbol Substitution Test. Outcome measures included gait velocity and rate of letter generation. PROCESS of SPSS was utilized to perform the analyses.

Results: Attention and executive functions partially mediated the associations between subjective sleep quality and reduced task performances for both single- and dual-task conditions. Specifically, poor subjective sleep quality was associated with more impaired attention and executive functions, which led to reduced gait velocity and rate of letter generation (indirect effect 95%CIs < 0). However, effects were not significant after adjusting for covariates, and there was no differential patterns between single- and dual-task conditions.

Conclusions: The current study supports the conclusion that diminished PFC functionality (measured by attention and executive functions) underlies reduced task performances due to poor subjective sleep quality. However, increased dual-task demands do not affect these effects. Further, age and age-related comorbidities are significant confounding factors.

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S. COOPER, K.R. THOMAS, C.G. WONG, X. CAO, D. SALMON & M. BONDI. Multiple Cognitive Domains Predict Progression from Cognitively Normal to MCI and Alzheimer's Disease.

Objective: Considerable evidence shows that cognitive changes occur years prior to diagnosis of Alzheimer's disease (AD). Previous work has demonstrated heterogeneity of cognitive profiles in mild cognitive impairment (MCI) related to AD, but there has been less emphasis on cognitive profiles in preclinical AD. We examined the utility of baseline cognitive domain composite scores in predicting progression from cognitively normal (CN) to MCI/AD.

Participants and Methods: CN older adults (*N*=209) from the UCSD Alzheimer's Disease Research Center underwent comprehensive neuropsychological testing that included 9 tests across 4 domains: memory (delayed recall-CVLT, WMS-LM, WMS-VR), language (BNT, category fluency), visuospatial (block design, WMS-VR copy), and executive function (EF)/attention (TMT-B, digit symbol). Domain composites were obtained by averaging individual test z-scores. Conversion to MCI/AD (*n*=98) was determined via consensus. Logistic regressions, adjusting for demographics, examined cognitive domain composites in predicting future MCI/AD status.

Results: Lower baseline memory (p<.0001; OR=.54), EF/attention (p<.0001; OR=.43), and language (p=.004; OR=0.58) composites predicted conversion to MCI/AD. Visuospatial function was not predictive of conversion (p=.11). Lower memory (p=.008; OR=.61) and EF/attention (p=.010; OR=.38) remain significant with all predictors in the model; visuospatial and language did not contribute unique predictive value (ps > .05).

Conclusions: Findings suggest that prodromal AD/AD-variants begin with memory, semantic, and frontal, but not visuospatial, changes, and underscore the importance of rigorous assessment of both amnestic and non-amnestic qualities in CN adults at risk of MCI/AD. Cognitive screeners and AD studies' use of episodic memory impairment at the exclusion of other cognitive functions may underestimate risk conferral. Findings support the notion of a preclinical AD phenotype in which objective subtle cognitive decline exists prior to frank cognitive impairment seen in MCI.

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D. COTTER, S.M. WALTERS, A. WOLF, E.C. FOX, M. YOU, M. ALTENDAHL, A.M. STAFFARONI, F. ELAHI, J. KRAMER & K.B. CASALETTO. Aging and Positive Mood: Longitudinal Neurobiological and Cognitive Correlates.

Objective: Aging is associated with more losses than gains (e.g., declines in cognitive and physical health, death of spouses and friends). Despite this, older adults demonstrate remarkably preserved emotional regulation. We investigated this outcome by examining relationship between age and mood symptoms, brain structure, and cognitive trajectories over time.

Participants and Methods: 728 functionally intact, longitudinally followed older adults (age M=66.9, 57.8%F, CDR=0; range 1–13 visits, M=2.5) completed a complete cognitive evaluation and the 30-item Geriatric Depression Scale (GDS). A subset (N=327) underwent brain MR imaging within 6 months. Results were analyzed using mixed-effects regression models controlling for gender, education, and total intracranial volume.

Results: As age increased over time, GDS scores improved (b=-.0.03, p<0.05). Subsequent analyses revealed that baseline age (b=-0.31, p<0.01), but not time in the study (b=-0.02, p>0.10) was driving the negative association with GDS over time. Of interest, the beneficial effect of older age on GDS attenuated and reversed after age 77 (baseline age*time β=0.10, p<0.001). Within-subject changes in executive functions (EF) and white matter hyperintensities (WMH) each interacted with age to predict changes in GDS over time (EF*age b=-0.43, p<0.03; WMH*age b=0.81, p<0.02). Older subjects with poorer EF and greater WMH exhibited worsening GDS. In those with enhanced EF and decreased WMH, the beneficial effect of older age on GDS persisted past age 77. There were no associations with memory, speed, semantic fluency or gray matter regions of interest (ps>0.05).

Conclusions: Previous studies have shown that positivity is linked to better cognitive control and leads to improved mood in older adults. Our results not only support these findings, but also establish a potential neurobiological explanation by showing analogous interactions between both EF and WMH with age to predict mood outcomes.

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K.R. CUNNINGHAM, N. HUYNH, A. HOLDER & M. SCHMITTER-EDGECOMBE. Comparing Functional Abilities Between Healthy Older Adults and Those with Cognitive Impairment Using the Night Out Task.

Objective: Individuals with cognitive impairment (CI) may maintain strong functional abilities due to compensation, making it imperative that we develop our understanding of the relationships between cognition, everyday functioning, and compensation. The Night Out Task (NOT) was developed as a measure of functional abilities that also captures process approach behaviors.

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Participants and Methods: Participants were 9 older individuals with (CI) due to mild cognitive impairment or mild dementia matched on age, gender, and education to 18 healthy older adults (HOA). Participants completed the NOT, which involves 8 subtasks in preparation for a night out (e.g., gather change for a movie). An android app-based scoring system allows for recording scores on 3 primary variables: Total Time, Accuracy, and a Sequencing Efficiency. Five process-approach variables are recorded including Pre-planning, Online planning, Multi-tasking, Self-corrections and Double-checking. Independent samples T-tests were used to compare the 2 groups.
Results: Despite spending more time Pre-planning, $t(25)$=2.26, p=.032, and engaging in more Mid-task planning, $t(25)$=2.09,p=.046, and less Multi-tasking, $t(25)$=-2.41, p=.023, the CI group performed more poorly than the HOAs on the NOT Task Accuracy, $t(25)$=2.49, p=.036, and Sequencing, $t(25)$=-2.88, p=.008, scores. The HOAs demonstrated more self-monitoring behaviors (i.e., Double-checking), $t(25)$=-3.02, p=.006, than the CIs.
Conclusions: The CI group performed more poorly than the HOAs on a complex open-ended naturalistic task despite the use of compensation that included increased use of planning behaviors and a reduction in multi-tasking. In contrast, the CIs engaged in fewer self-monitoring behaviors than HOAs. It may be that self-monitoring involves a heavier cognitive load, making it a more difficult strategy for individuals with CI to use. Taken together the data may indicate that the use of internal compensatory behaviors is less effective for individuals with CI.
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V.A. DEL BENE & J. BRANDT. Detecting Cognitive Impairment in Physicians.
Objective: Aging physicians are vulnerable to health conditions that affect us all, such as mild cognitive impairment (MCI), dementia, and other syndromes and diseases that affect the brain. Cognitively impaired physicians can inadvertently harm patients through misdiagnosis, surgical complications, case mismanagement, or prescription error, which increases the risk of litigation. Since physicians are almost always well above average premorbid intellect, they may still perform in the "normal" range on neuropsychological tests when clearly impaired. We sought to determine criteria for the detection of impaired physicians.
Participants and Methods: Clinically-referred physicians (n = 23) and healthy working urologists (n = 39) were administered a battery of neuropsychological tests. Nine raw scores were converted to z-scores with the healthy urologists serving as the reference group. Z-scores ≤ -1.67 (i.e., 5th percentile) were considered abnormal. Based on this, the referred cases were divided into "impaired" and "ambiguous" groups. Analysis of variance was used to assess group differences on neuropsychological tests.
Results: The probability of scoring ≤ 5th percentile on >5 measures would almost never occur by chance (0.55%). Ten of the 23 referred doctors (43%) were impaired by this criterion. We refer to the remaining 13 as "ambiguous." The impaired physicians have IQ scores in the average range (M = 104, SD = 9.38), while the ambiguous group have IQ scores in the superior range (M = 123.37, SD = 13.94). Further, our impaired physicians performed below the ambiguous group on eight of nine neuropsychological tests (F(1,20)=9.56, p <.001, η^2 = .887), and were less likely to still be practicing medicine χ^2 = 3.97, p = .046.
Conclusions: This approach can conservatively detect physicians with cognitive impairment and can help guide clinical judgment about a physician's fitness to practice medicine. These results represent an attempt to address a growing public health issue (i.e., aging and otherwise impaired physicians).
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J.S. DIXON, A.E. COYNE, M.A. MATHER, L. SUN & R.E. READY. Ethnic Group Differences in Predictors of Cognitive Performance for Midlife Women.
Objective: Alzheimer's disease and other dementias are more prevalent in Hispanics and African Americans than European Americans. Dementia pathology begins in midlife and several risk factors for cognitive decline have been identified, including depressive symptoms, diabetes, hypertension, and smoking. It is not known if these risk factors are equally predictive of cognition across ethnic groups. We determine if ethnicity moderates the association between risk factors and concurrent processing speed, working memory, and episodic memory scores. We hypothesize – due to evidence of health disparities in minority populations – stronger associations between risk factors and cognitive outcomes in Hispanics and African Americans compared to European Americans.
Participants and Methods: Participants (N = 2,679) were from the Study of Women's Health Across the Nation. Diabetes risk was measured by fasting blood glucose; hypertension risk by average systolic blood pressure; smoking by average cigarettes per day; and depressive symptoms with the Center for Epidemiological Studies-Depression Scale. Cognitive outcomes were the Symbol Digits Modalities Test, WAIS-IV Digit Span Backwards, and East Boston Memory Test (EBMT) delayed recall.
Results: Ethnicity significantly moderated the associations between depressive symptoms and EBMT, as well as between diabetes risk and EBMT; in both cases, there was a significant negative association for Hispanics but none for European Americans. Smoking was associated with a higher DSB score for African Americans but not for European Americans.
Conclusions: As hypothesized, Hispanic Americans' memory at midlife may be more adversely affected by diabetes and depressive symptoms than for European Americans; dementia prevention efforts should be tailored accordingly. Our hypotheses were not supported with regard to African American outcomes. We plan to further explore this unexpected result in longitudinal analyses.
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A. ECONOMOU, E. PAPADIMITRIOU, I. BERATIS, S. PAPAGEORGIOU & G. YANNIS. Intraindividual Variability Within and Across Conditions in Driving Simulator Measures of Healthy Drivers of Different Ages.
Objective: To investigate intraindividual variability in healthy drivers of different ages in driving simulator measures in different driving environments and conditions.
Participants and Methods: Participants were 72 healthy active drivers 22-78 years of age who completed all four rural (R) conditions (M = 43.75, SD = 15.97) and 60 drivers who completed all four urban (U) conditions (M = 42.03, SD = 15.69). All drivers underwent a neurological, neuropsychological, and ophthalmological assessment and drove a Foerst FPF driving simulator. Conditions were: moderate traffic-no distraction (R1 & U1), high traffic-no distraction (R2 & U2), moderate traffic-conversation (R3 & U3), high traffic-conversation (R4 & U4). Continuous vehicle data obtained every 17 msec were recorded. The coefficient of variation (CV) was computed by dividing the intraindividual SD by the intraindividual M to provide a measure relative to the driver's level of performance for: speed; headway distance (from the vehicle ahead); lateral position (distance from the right road border).
Results: Repeated measure analyses with condition as within-subject variable and age group as between-subject variable were conducted. In R conditions there was no effect of age group (22-34 years =28; 38-53 years = 27; 55-78 years = 17) for any of the measures. An effect of condition was found for headway and lateral position (ps < 0.001), with greater CV for headway and smaller CV for lateral position in R2 and R4; and a condition by age group interaction for lateral position (p < 0.05). In U conditions there was no effect of age group

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(22-34 years =26; 38-53 years = 22; 55-78 years = 12) for any of the measures. An effect of condition was found for headway ($p < 0.001$), with greater CV in U2 and U4.
Conclusions: Intraindividual variability is stable across different ages, once corrected for performance level. High traffic conditions result in greater headway variability (R & U environments) and smaller lateral position variability (R environment).
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O. ELKANA, T. BEN-PORAT, J. HAUSDORFF, O. REICHMAN EISIKOVITS, N. OREN & E. L. ASH. Gait Measures Predict Cognitive Decline in Highly Educated Older Adults: 4-years Longitudinal Study.
Objective: Background: It has been found that gait impairment and falls are associated with the severity of cognitive impairment and are also more common among patients with dementia.
Objective: To identify whether gait measures (stride-time variability and stride regularity) can predict cognitive decline in healthy educated older adults.
Participants and Methods: Participants and Methods: 27 participants (12 men and 15 women) ages 68-83 (Mean = 75.07, SD=4.62), high education level (Mean= 17.14 years, SD= 3.21) undergo cognitive assessment once a year (T0, T1, T2, T3 and T4) for four consecutive years. The following cognitive assessments were performed: Montreal Cognitive Assessment test (MoCA); Rey Auditory Verbal Learning Test (RAVLT); Rey Osterrieth Complex Figure test (ROCF); Wechsler Adult Intelligence Scale (WAIS-III): Information and Digit Span Subtests; Trail Making Test (TMT); Verbal Fluency Test and Beck Depression Inventory questionnaire (BDI). Gait measures were performed only at T0. All standardized score were analyzed by Pearson correlations and repeated measures ANOVA.
Results: Results: Significant correlations were found between gait measures and cognitive decline in the ROCF-copy, a sensitive measure for cognitive decline in highly educated adults (Δ of T1- T4 and stride-time variability ($r=0.55$, $p<0.01$); and with stride regularity ($r=-0.40$, $p<0.05$
Conclusions: Conclusions: Gait measures such as stride-time variability and stride regularity might be helpful in assessing for the earliest stages of cognitive decline in highly educated older adults.
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N.D. EVANGELISTA, S.N. HOFFMAN, S.F. SORG, S.M. JURICK, M. SANDERSON-CIMINO, J.C. CHALMERS, L. DELANO-WOOD, A. JAK, M. BONDI, M. LAMAR & K.J. BANGEN. APOE Genotype Differentially Affects the Relationship Between Myelin Integrity and Memory Performance in Nondemented Older Adults.
Objective: Apolipoprotein E (APOE) genotype and white matter alterations have been independently associated with poorer memory performance and increased risk for Alzheimer's disease (AD). However, the relationship between APOE genotype and myelin water fraction (MWF) – an in vivo marker of myelin integrity – remains understudied. We therefore sought to clarify associations between MWF, APOE genotype, and memory.
Participants and Methods: Thirty-two nondemented older adults (mean age = 73.8 years) underwent neuropsychological assessment, magnetic resonance imaging (MRI), and APOE genotyping. Participants were divided into (1) APOE ε4 carriers (n=8) and (2) non-carriers (n=24). The California Verbal Learning Test II (CVLT-II) was used to assess memory. Multicomponent driven equilibrium single pulse observation of T1 and T2 (mcDESPOT) MRI was used to quantify MWF in brain regions of interest connected to the medial temporal lobe (MTL).
Results: Results showed that APOE ε4 carriers had significantly reduced MWF in the right hippocampal region of the cingulate gyrus ($p<.05$), and a trend for reduced MWF in the right fornix stria terminalis ($p = .054$) and splenium of the corpus callosum ($p=.061$). Additionally, among APOE ε4 non-carriers, higher fornix MWF was significantly associated with better memory performance ($p<.05$). There was no such association among ε4 carriers.
Conclusions: Our results demonstrate that APOE ε4 carriers have significantly reduced MWF in MTL white matter pathways known to be preferentially affected early in the AD process. These findings bolster prior work showing that APOE ε4 carriers are vulnerable to white matter alterations. Moreover, they demonstrate that greater MWF in the fornix supports better memory performance in non-ε4 carriers but not ε4 carriers. Findings suggest that APOE genotype may differentially affect the relationship between myelin integrity and memory performance and that MWF may serve as a useful marker of dementia risk.
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K.L. SIEDLECKI, F. FALZARANO & T.A. SALTHOUSE. Examining Sex Differences in Neurocognitive Functioning across Adulthood.
Objective: Recent debate surrounding the lack of proportionate representation of women in science-related fields has included the examination of neurocognitive differences between the sexes (Berenbaum & Resnick, 2007). The goals of the current study were to 1) examine gender differences in neurocognitive functioning across adulthood, and 2) examine whether age moderates the gender effect on neurocognitive functioning.
Participants and Methods: Data from the Virginia Cognitive Aging Project (VCAP), a prospective study of cognitive functioning in community dwelling adults between the ages of 18-99 years, were used (N=5,125). Participants completed 16 tests within five domains of cognition: episodic memory, processing speed, reasoning, spatial ability, and vocabulary.
Results: First, latent variable analyses revealed that men and women had similar structural relations, with evidence of configural and metric invariance for a five-factor model of neurocognitive functioning. Next, a model with gender as a predictor of the five latent neurocognitive constructs (and age, education, and self-rated health as covariates) fit well, X^2= 3564.46, df= 138, CFI= .941, RMSEA= .070. In this model, women performed better on memory (β= .18*), and speed (β= .11*), and worse on spatial ability (β= -.17*). Gender was not significantly related to vocabulary (β= -.03) or reasoning (β= .02). To examine age moderation, the sample was divided into three age groups: 18-39 yrs (n= 1,425), 40-64 yrs (n= 2,482), and 65-99 yrs (n= 1,218). There was no evidence of age moderation except for vocabulary; gender was a significant predictor (β= .14*) of vocabulary in the younger group, but not in the other two age groups.
Conclusions: In a large sample of individuals spanning adulthood, there was evidence of a small but reliable gender effect such that women performed better on measures of episodic memory and processing speed and men performed better on measures of spatial ability. There was little evidence of age moderation.
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F. FALZARANO, K.L. SIEDLECKI, B. RIZVI, M. BUDGE, J.M. COLÓN, K. IGWE, N. SCHUPF, J.J. MANLY, R. MAYEUX & A.M. BRICKMAN. How Much Variance in Neurocognitive Functioning in Older Adults can be Explained by Neuroimaging Markers of Brain Volume and Small Vessel Cerebrovascular Disease?
Objective: The variance shared among cognitive variables can be referred to as the g factor. Several neuroimaging variables have been proposed to account for the variance in neurocognitive functioning (g).

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Although the predictive validity of these factors is often examined in isolation, many of these variables are related to one another. As such, it is useful to examine the influence of multiple neuroimaging measures simultaneously in order to identify unique influences on *g*. Thus, the goal of the current study was to examine the age-related neuroimaging correlates of *g* in older adults.
Participants and Methods: Participants (*N*= 524) were between the ages of 62- 96 years who are part of Wave III of the Washington Heights-Inwood Columbia Aging project, a prospective longitudinal study of cognition in a community-based sample. The sample comprised 31.1% non-Hispanic White, 36.3% African American, and 30.0% Hispanic participants. Participants completed a battery of neuropsychological tests that were administered in their preferred language (English or Spanish) to assess memory, language, visual-spatial ability, and reasoning.
Results: A multiple indicators multiple causes (MIMIC) structural model was used to evaluate how much variance in *g* can be accounted for by six neuroimaging variables including relative total brain volume (TBV), cortical thickness, total white matter hyperintensities volume, presence of infarct, total microbleeds, and total fractional anisotropy. Within the non-Hispanic White and African American subsamples, the neuroimaging variables accounted for 23.9% and 19.2% of the variance in *g*, with TBV and cortical thickness having the largest relationships with *g*. The neuroimaging variables accounted for substantially less variance in *g* (6.3%) in the Hispanic subsample.
Conclusions: Neuroimaging variables accounted for a significant amount of variance in *g*, with differences observed among African American, non-Hispanic White, and Hispanic subgroups.
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E.C. FOX, K.B. CASALETTO, A.M. STAFFARONI, S. ERLHOFF, V. BOURAKOVA, S.M. WALTERS, F. ELAHI, R. LA JOIE, M. YOU, M. ALTENDAHL, D. COTTER, G. RABINOVICI, K.L. POSSIN & J. KRAMER. Greater adherence to the MIND diet is associated with lower amyloid burden and better memory and mood in clinically normal older adults.
Objective: Large-scale epidemiological studies have shown associations between Mediterranean-style diets, better cognitive outcomes, and lowered incidence of Alzheimer's disease (AD). The mechanisms by which diet may mediate decline, however, remain unclear. Our study examined associations between adherence to the MIND diet (Mediterranean-DASH Intervention for Neurodegenerative Delay; a diet specifically targeting brain health) and clinico-pathologic markers of AD including amyloid burden, cognition, and mood, in clinically normal older adults.
Participants and Methods: 31 clinically normal, community-dwelling older adults (mean age=74.9, 61% female, CDR=0) completed a 15-item diet questionnaire assessing adherence to the MIND diet. Participants also completed β-amyloid PET imaging ([18F]Florbetapir), a brief mood assessment (GDS), and measures of memory, executive functions and speed, and spatial processing from the UCSF Brain Health Assessment within 180 days of completing the MIND diet questionnaire.
Results: Controlling for age, sex, BMI, and exercise habits, higher MIND scores were significantly associated with lower [18F]Florbetapir SUVR values (partial r=-0.40, p=.048), better memory performances (partial r=0.47, p=.02), and lower depression scores (partial r =-0.52, p=.006). MIND scores were not significantly associated with executive functioning or spatial processing performances (ps>0.05).
Conclusions: Greater adherence to the MIND diet was associated with several AD-related markers of brain health – cerebral amyloidosis, memory performance, and mood – in clinically normal older adults. This finding supports the hypothesis that diet may be an important modifiable risk factor for AD, and that adherence to a "brain healthy" diet could be a reasonable target for prevention of age-related pathological brain changes.
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J. GERMAIN, S. WEISENBACH, V. KOPPELMANS, J. KIM, V. PATRON, A. ARP, A. BRADFORD, N. GRUBMAN, N. HOVATTA, R. WELSH & S.A. LANGENECKER. Resting State Brain Network Dysfunction and Cognition in Late Life Depression.
Objective: Older adults with depression show performance variations in multiple cognitive domains relative to their never-depressed peers (Koenig et al., 2015). Resting state (RS) brain activation studies demonstrate abnormal patterns functional connectivity in pathways essential to higher-order cognitive functioning in a variety of neurological and psychiatric conditions. This study aims to examine cognitive functioning and connectivity within three major networks important to cognition in depressed and non-depressed elder adults: right and left Cognitive Control Network (CCN) and Default Mode Network (DMN).
Participants and Methods: 31 never-depressed, cognitively normal (HC) older adults (M age=66, SD=4) and 13 older adults with Major Depressive Disorder (MDD; M age=70, SD=6) underwent a comprehensive neurocognitive test battery and an 8-minute RS fMRI scan. Using independent component analysis to segregate DMN and right and left CCN, RS networks were identified. ANCOVAs examined between-group differences in network strength, covarying for age, site, and individual correlation with the template brain.
Results: MDD and HC did not differ in performance on measures of memory, processing speed, complex attention, working memory, language or psychomotor speed. However, connectivity coherence within the DMN (F [1, 39]=5.26; p<.05, partial eta^2=.12) and left CCN (F [1, 39]=4.84; p<.05, partial eta^2=.11) was lower in MDD, relative to HC. Connectivity was marginally lower in MDD for right CCN (F [1, 39]=2.35, p=.13, partial eta^2=.06).
Conclusions: Despite similar performances on cognitive measures, older adults with MDD demonstrate less functional coherence in DMN and left CCN. Changes in brain structure and function often precede behavioral changes (Singh et al., 2014). Variability in DMN and CCN network functioning may predict future cognitive decline among older people with depression, who are at greater risk of dementia relative to the general population (Saczynski et al., 2010).
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B. GIORDANI, Y.L. MURPHEY, N. SCAPINI, J. REINHOLD, C. GOETZ, K. WANG, D. EBY, L.J. MOLNAR, J.S. ZAKRAJSEK, S. STENT & C.C. PERSAD. Analysis of NIH Toolbox-Cognition Measures and Their Correlation to Driver Physiological Signals Recorded During Challenging Real-World Driving.
Objective: Most studies of driver ability and physiology use laboratory-based driving simulators. More recently, real-world driving data are collected, but with complex, specially-instrumented vehicles. Neuropsychological variables are seldom obtained for comparison. In this pilot study, we look at the relationship between cognitive and physiological variables recorded through a novel and transportable system for acquiring data using a driver's own vehicle.
Participants and Methods: Participants included 12 older drivers (9 males, 3 females; age=77±6) recruited from the Claude Pepper and Michigan Alzheimer's Disease centers' pools of nondemented, community dwelling participants. Cognitive testing was completed with the computer-based NIH Toolbox-Cognition. We utilized a transportable, portable data acquisition system to acquire drivers' heart rate, respiration, skin conductance, vehicle performance, and videos of the vehicle environment and the driver's face during naturalistic driving. Machine learning and sensor fusion algorithms automatically segmented trips into sequences of driving scenarios, using Nokia/HERE's extensive Geographic Information System. This study presents traffic through street, highway, and ramp scenarios

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Results: A physiological profile was derived for each driver and correlated with neuropsychological findings. Toolbox Fluid Composite was correlated with physiological arousal during highway (r = -0.67, p<.03) and ramp situations (r = -0.68, p<.04), with measures of executive functioning (card sort; r = -0.66 to -0.79) and processing speed (pattern comparison; r = -0.63 to -0.83) driving these results. Significant correlations were not found for street situations or for any Crystalized Composite variables.
Conclusions: Fluid cognitive and driver arousal levels are clearly related in more complex driving scenarios (highway, ramp). In-car advanced technologies may provide important information in predicting at-risk situations and providing real-time medical information.
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M. GOGNIAT, C. MEWBORN, T.L. ROBINSON, K. JEAN & L.S. MILLER. Activity, Executive Function, and White Matter Integrity in Older Adults.
Objective: Evidence suggests that increased activity in later life may be neuroprotective, but the mechanisms by which activity preserves cognitive function are not well understood. Thus, the purpose of this study was to determine the relation between activity level, executive function, and white matter integrity in healthy older adults.
Participants and Methods: Participants were 43 older adults (M = 73.1 years; SD = 5.68) enrolled in a study where they participated in neuropsychological testing, physical activity and fitness measurements, and magnetic resonance imaging (MRI). Physical activity was calculated as the average amount of steps taken in one week using the NL-1000 Accelerometer. Executive function was measured using a composite of scaled scores from the Delis-Kaplan Executive Function System (DKEFS). Diffusion weighted images (DWIs) were collected and used to determine the integrity of white matter tracts (FA, MD, AD, RD) in *a priori* regions of interest (ROIs) implicated in age-related decline: corpus callosum, uncinate fasciculus, superior longitudinal fasciculus, cingulum, and fornix. Scans were processed using FMRIB Diffusion Toolbox and Tract Based Spatial Statistics (TBSS). A single value based on a binary mask for each ROI was generated for each participant. PROCESS in SPSS was used for mediation analysis controlling for age and ROIs.
Results: When controlling for age, average steps significantly predicted executive function (ΔR^2 = .163, F(2,40) = 4.577, p=.016). However, white matter integrity (FA, MD, AD, RD) did not mediate this association in any of the proposed ROIs.
Conclusions: Results suggest that greater activity in later life predicts better executive function; however, this relationship may not currently be explained by white matter integrity in the age-related ROIs chosen. This work should be replicated and exploratory analyses should be conducted to determine whether there are other regions of interest that may mediate this relationship.
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E.I. GRACIAN, D. KAZAKOV, D. WRIGHT, M. AUSTIFF, D.C. OSMON & K. MOSACK. Non-Uniform Age-Related Differences, Concurrent Validity, and Neuropsychological Correlates of WebEXEC in Cognitive Normal Older Adults.
Objective: WebEXEC is a 5-item questionnaire that assesses cognitive complaints. The aims of this study are to determine WebEXEC concurrent validity with existing self-report measures of cognitive concerns, clarify its neuropsychological correlates, and determine if non-uniform age-related differences exist. Previous investigators dichotomized cognitively normal older adults into impaired-older (IO) and unimpaired-older (UO) subsets and found that IO adults were disproportionately deficient in cognitive abilities that could be predictive of forthcoming Alzheimer's disease. Additionally, UO adults reported more subjective cognitive complaints than IO adults on the Prospective and Retrospective Memory Questionnaire (PRMQ).
Participants and Methods: Twenty-eight older adults (Women n = 27; Mean Age = 73 years, SD= 8.1) completed measures of executive function (EF), memory, the PRMQ, and WebEXEC questionnaire. Older adults were classified as IO (n=13) or UO (n=15) based on performance on a verbal learning test; IO adults did not perform within the normal range.
Results: WebEXEC was significantly related to the PRMQ (p < .001). Although the PRMQ is significantly correlated with standardized measures of memory and EF (p < .05), WebEXEC is not due to a lack of statistical power. However, UO adults reported significantly more subjective cognitive complaints on WebEXEC than IO adults (p = .011; *Cohen's d* = 0.86).
Conclusions: WebEXEC is significantly related to the PRMQ, suggesting concurrent validity with an existing self-report measure for subjective cognitive complaints. Second, we did not have sufficient statistical power to determine the neuropsychological correlates of WebEXEC, but given its significant correlation with the PRMQ, we can predict that it will be related to EF and memory measures when sufficient power is achieved. Finally, UO adults reported more subjective cognitive problems than IO adults on WebEXEC, possibly due to sharper insight in the UO group, or lesser insight in the IO group.
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A. GRADONE, K. MCGREGOR, J.R. NOCERA & V. DOTSON. Effect of Aerobic Exercise on Default Mode Network Activity in a Late-Life Population.
Objective: Previous randomized controlled trials (RCTs) have shown that aerobic exercise is effective in treating depression and also has positive benefits for brain health and function. The goal of the current study was to determine the impact of changes in subthreshold depressive symptoms on functional connectivity in the default mode network (DMN) after an exercise intervention.
Participants and Methods: In this 12-week randomized controlled trial, thirty-seven healthy older adults were assigned to an aerobic exercise group (n = 19) or a nonaerobic balance control group (n = 18). Before and after the intervention, participants underwent functional magnetic resonance imaging at 3T and completed the Beck Depression Inventory, Second Edition (BDI-II). Seed-based functional connectivity analyses were conducted in AFNI using analyses of covariance with BDI-II change scores (post – pre intervention scores) as a covariate of interest to determine the impact of BDI-II change on group differences in functional connectivity after the intervention. Separate analyses were conducted for seeds in the anterior DMN (aDMN) and posterior DMN (pDMN).
Results: Change in BDI-II scores predicted greater changes in functional connectivity in the aerobic exercise compared to the control group within the aDMN and pDMN. Changes included increased connectivity of the anterior and posterior cingulate with prefrontal, temporal, and cerebellar regions, and decreased connectivity between the anterior cingulate and middle temporal gyrus, and between the posterior cingulate and ventromedial prefrontal regions.
Conclusions: These findings suggest that changes in depressive symptoms and functional connectivity within the DMN after aerobic exercise are interrelated. Further research is needed in larger samples to clarify the mechanisms underlying the antidepressant effect of exercise in older adults.
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F.S. AHMED, T. MCMILLAN, P. DEARBORN & B.A. GUENTHER. Cognitive Outcomes following Prescribed Exercise Intervention among Middle-Aged Adults: A Systematic Review.

Objective: As dementia rates continue rising, there is a corresponding rise in prevention research. One such area of prevention is in exercise intervention. While there are many publications on the effects of exercise on cognition among older adults, the focus of prevention research is shifting towards an earlier age (i.e., among middle-aged adults). Given that the pathophysiology of dementia can start quite early (e.g., decades for Alzheimer's disease), we conducted a systematic review of current publications on prescribed exercise in middle-aged adults with cognitive functioning as an outcome measure.

Participants and Methods: This review was registered on PROSPERO following the PRISMA statement guidelines. Multiple electronic databases (PubMed, MEDLINE, Cochrane Central Register of Controlled Trials, and Google Scholar) were searched for studies on cognitive functioning following an exercise intervention in middle-aged adults published within in the past 30 years.

Results: Search terms yielded 14,037 possible matches. After reviewing titles (and, when necessary, abstracts), 54 studies were reviewed for eligibility, resulting in 14 articles eligible for this review. Seven studies utilized control groups, and the remaining were pre-post within-subjects designs. None of the studies administered comprehensive neuropsychological measures; the majority examined some tests of executive functions (though not comprehensive), attention, and/or processing speed. Statistically significant improvements were found in the majority of these studies, but the degree and stability of improvements varied across studies.

Conclusions: To our knowledge, this is the first systematic review exploring cognitive effects of prescribed exercise in this age group. The variability in designs and methodological rigor limits interpretation of findings; however, these results indicate a need for randomized control trials with a breadth of validated, neuropsychological measures.

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D. HAN, K. ARFANAKIS, D. FLEISCHMAN, L. YU, D. BENNETT & P. BOYLE. White Matter Correlates of Temporal Discounting in Older Adults.

Objective: Temporal discounting, the tendency to select a smaller reward offered sooner over a larger reward offered at a later time, has been associated with a number of real-world decision making outcomes important for health and wellbeing. Neurobiological mechanisms supporting temporal discounting have been explored among younger participants, and these have considered white matter integrity. However, the white matter correlates of temporal discounting in older adults are unclear. We hypothesized that greater temporal discounting would be associated with poorer white matter integrity measures, more specifically lower fractional anisotropy and higher trace, in older adults.

Participants and Methods: Participants were 302 older persons without dementia (mean age =81.38, mean years of education =15.75, 75.5% female, mean MMSE =28.29) from the Rush Memory and Aging Project, a community-based longitudinal study of aging. Temporal discounting was assessed using standard elicitation questions. White matter integrity was assessed with diffusion tensor imaging (DTI). Regression models were adjusted for the effects of age, sex, education, and white matter lesions. Secondary models further adjusted for global cognition.

Results: Results revealed significant associations between temporal discounting and white matter integrity measures (FA and trace) in bilateral frontal, frontostriatal, and temporal-parietal lobe white matter tracts, and results remained significant after further accounting for global cognition.

Conclusions: These results suggest that temporal discounting is inversely associated with white matter integrity in old age and that this association is independent of global cognition.

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D.C. HERGERT, J. PRESTOPNIK, A. CAPRIHAN & G. ROSENBERG. Exploring the Relationship Between the Blood-Brain Barrier and Cognitive Functioning in Neurodegenerative Diseases.

Objective: Theoretical models suggest a causal relationship between cardiovascular risk factors and neurodegenerative diseases. One theory suggests that chronic hypoxic hypoperfusion causes inflammation that disrupts the blood-brain barrier (BBB), which is then associated with neurodegeneration (Yang & Rosenberg 2011; Rosenberg et al., 2016). There have been no studies that have examined the relationship between BBB permeability and cognition using a full neuropsychological battery. The purpose of this study was to explore which cognitive functions may be associated with BBB permeability in a mixed patient sample.

Participants and Methods: 57 patients (mixed sample of Alzheimer's disease (AD), vascular cognitive impairment, leukoaraiosis, mixed vascular/AD, unspecified cognitive disorder) and 40 controls were recruited from the University of New Mexico Memory and Aging Center. There was no difference in age between patients (M=67.4, SD= 8.3) and controls (M=65.8, SD=8.7), p=.39. Participants were administered a standard battery of neuropsychological tests and underwent MRI procedures (3T) to obtain mean BBB permeability values and volumetric data.

Results: Patients had more cardiovascular risk factors (OSA, hypertension, diabetes, stroke) than controls $\chi^2(1)$=44.8, p<.001. PCA with direct oblimin rotation was used to reduce the number of cognitive variables for the entire sample of participants. Processing speed measures loaded onto Factor 1 and memory measures loaded onto Factor 2. For the patients, the processing speed factor was significantly correlated with BBB permeability (Kendall's tau-b=-.273, p<.05), but not memory (p=.5). There was no relationship between cognition and BBB permeability in the control group.

Conclusions: This is the first study to show a relationship between processing speed and BBB permeability in a mixed patient group, but not in controls. Results support theoretical models that suggest a BBB connection to neurodegenerative diseases.

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M. IVANISEVIC, Z. ROMAN & J. DAVID. Subcomponent processes of Executive Functions in Older Adults.

Objective: Executive Functioning (EF) are higher-order cognitive abilities that enable us to execute goal-directed behaviors. Previous researchers have used confirmatory factor analyses (CFA) to parse out higher-order processes into specific indices. Miyake et al.(2000) identified that a three-factor model that best explains EF in young adults. Vaughn & Giovanello (2010) found that a two-factor model best explains EF in older adults. No other study to date has examined the factor structure of EF in older adults using this same cognitive battery. In this study, we use CFA to compare a two- and three- factor model of EF in older adults, controlling for age and processing speed (PS).

Participants and Methods: Participants were 89 older adults between 66 and 90 years of age(mean age= 73.3, SD = 6.34). Participants completed the cognitive battery developed by Miyake and colleagues. This included nine subtests and two added subtests to asses PS. CFA were used to examine construct validity of EF in healthy older adults.

Results: Results show a three-factor model with inhibition, updating, and shifting demonstrating good model fit, chi-square = 34.41, p = .49; RMSEA =.00; SRMS =.05. Three separate nested two-factor models were also estimated. Findings show that when inhibition was set to equal updating, the two-factor model showed similar model fit as the

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three-factor model, chi-square= 34.56, p = .82; RMSEA = .00; SRMR =.05. Similar results were found when inhibition was set equal shifting.
Conclusions: These data demonstrate that a two-factor model that constricts inhibition as a construct is equivocal as a three-factor model. A two-factor model that does not constrict inhibition demonstrates poor model fit. These findings are similar to those by Snyder et al.(2015) demonstrating that inhibition does not load to a respective independent factor relative to updating and shifting. These findings provide evidence to further explore how inhibition is understood as a construct of EF, particularly in older adults.
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S. JACOBS, E. DEMETRIOU & R. HOLTZER. Intra-Individual Variability in Performance Trajectories of Verbal Fluency is Moderated by and Predictive of Mild Cognitive Impairment.
Objective: Research concerning the effect of Mild Cognitive Impairment (MCI) on intra-individual variability in phonemic and category fluency performance has been limited. Within verbal fluency, intra-individual variability can be operationalized using the slopes of word generation during the course of task administration. The current study had three primary aims: 1) determine the effect of MCI on within task verbal fluency slopes; 2) determine the effect of MCI on slopes of overall verbal fluency performance assessed annually over longitudinal follow-up; 3) use within task verbal fluency slopes at baseline to predict incident MCI.
Participants and Methods: Participants (n=514) consisted of non-demented community-dwelling older adults over the age of 65 who were assessed annually over a five-year follow-up. Phonemic and Category fluency was measured by the Control Oral Word Association Test. For each one-minute verbal fluency trial, word production was demarcated by three 20-second intervals (0-20, 21-40, 41-60), which were used to determine individual within task performance slopes.
Results: Linear mixed effects models (LME) revealed that MCI moderated the decline in word production during phonemic (estimate=1.24; p<.001) and category (estimate=1.20; p<.001) fluency. LMEs also revealed that MCI attenuated longitudinal improvements in phonemic fluency performance (estimate=-.33; p=.017) but not in category fluency (estimate=.04; p=.779). Finally, Cox analysis revealed that within task category fluency slopes at baseline was a significant risk factor for incident MCI (HR=2.23; p=.006). All analyses controlled for age, gender, education, disease comorbidity and overall level of cognitive function.
Conclusions: Intra-individual variability measures of verbal fluency provide incremental information, beyond central tendency measures, that can be used to predict age-related decline in cognitive function and risk of transition states such as MCI.
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M.B. JURADO, J. TRUJILLO, L. SALEM, L. DIAZ & D. GONZALEZ. Cognitive Correlates of Instrumental Activities of Daily Living in a Sample of Non-Demented Ecuadorian Older Adults.
Objective: Instrumental activities of daily living (IADLs) are complex everyday activities that enable adults to live independently and are central to the diagnosis of dementia and mild cognitive impairment. Executive and memory abilities have often been identified as predictors of functional status of older adults. In the present study we aimed to evaluate the cognitive correlates of two performance-based measure of IADL, a pillbox organizing task and a task of financial skills that involved counting change and paying bills.
Participants and Methods: 40 community-dwelling, Spanish-speaking older adults (90% female, 76.60 ± 6.1 mean age, 12.7 ± 3.5 years of schooling) were evaluated on performance-based measures of medication and money management and a battery of neuropsychological tests. Participants were free of significant neurological, psychiatric or cerebrovascular disease and were excluded if they had low scores on the Mini Mental State Examination (MMSE), adjusted to their level of educational attainment as has been proposed in the literature. Multiple regression analyses were conducted to examine the predictive value of composite measures of memory, executive functioning, visuospatial functioning and language on medication and money-management skills.
Results: After controlling for educational attainment, only the memory composite score was predictive of both performance on the financial task (β=.317, p=.025), and the number of errors committed on the pillbox organizing task (β=-.425, p=.011).
Conclusions: In the present study, memory capacity, but not executive, visuospatial or language function, was associated with performance on two objective measures of financial kowledge and medication management. Due to the importance of IADLs, not only to the functional autonomy of older adults but also for their role in the diagnosis of cognitive impairment, further study into the association betweeh IADLs and cognitive functioning is warranted.
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L.S. KABIR, P. SUNDERARAMAN, S. HO, Y. STERN & S. COSENTINO. Financial Literacy and Numerical Ability in Healthy Older Adults.
Objective: Financial literacy in older adults has been linked to positive outcomes not only in financial well-being, but also in relation to cognitive and psychological functioning. Little is known about how different types of numerical abilities relate to financial literacy in advanced age. Understanding the contributors to financial literacy may reveal pathways toward improved financial and health outcomes among older adults. The current study examined financial literacy in relation to numerical abilities including arithmetic, complex numeracy and reflective thinking in cognitively healthy older adults.
Participants and Methods: Participants were recruited from a larger, ongoing study of cognitive aging: n=50; mean age=68.6, *SD*=5.39; mean years of education=15.9, *SD*=2.14; 62% females; 70% Caucasian. Financial literacy was measured using a standard set of 23 questions. Numerical abilities were measured using the WAIS-III Arithmetic that assesses mental arithmetic, and an abbreviated, 8-item version of the Cognitive Reflection Test that assesses complex numeracy and reflective thinking.
Results: Bivariate correlations revealed that education (but no other demographic variable) was related to financial literacy. Financial literacy was regressed on WAIS-III scores, numeracy, and number of years of education using a multiple regression analysis. Results revealed that the three predictors explained 60% of the variance in financial literacy (R^2=.60, Adjusted R^2=.57, $F(4,45)$=23.496, p<.001) with numeracy (β=.440, p=.001) and education (β=.338, p=.002) having individual associations with financial literacy.
Conclusions: Among community-dwelling older adults, higher levels of financial literacy were associated with better numeracy and reflective thinking abilities, as well as higher levels of education. Targeted interventions to improve these specific abilities could facilitate better financial decision making in older adults.
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S. KAUR, N. BANERJEE, M. MIRANDA, M. SLUGH, K. MCINERNEY & B. LEVIN. Sleep as a potential mediator for the relationship between frailty and cognitive function.
Objective: Frailty is associated with a host of negative outcomes including cognitive decline in older adults. However, the mechanisms behind this relationship are poorly understood. Increased frailty is also associated with poor sleep quality. We hypothesized that sleep quality may play an important role in understanding how frailty and cognition are related in a sample of nondemented older adults.

Participants and Methods: Data from 154 participants aged between 50-90 years (mean age = 69.14 years, S.D= 9.21 years) were analyzed. Participants underwent a full neuropsychological evaluation, frailty assessment using Fried et. al (2001)'s frailty phenotype and completed questionnaires on subjective sleep quality. Direct relationships between frailty, sleep and cognitive function were assessed using Ordinary Least Squares regression models. Statistical mediation was assessed using nonparametric bootstrapping procedures.
Results: Frailty severity was significantly associated with poorer performance on measures of executive function (β = -3.07, p <0.001) and learning (β = -1.43, p = 0.04) when controlling for the effects of education. Poor sleep quality was associated with poorer performances on measures of executive functioning (β = -0.62, p =0.001), learning (β = -0.57, p =0.002), and delayed recall (β = -0.60, p =0.007) when controlling for relevant covariates (education, depression and anxiety where applicable). Poor sleep quality statistically mediated the relationships between increased frailty severity and executive function (β = -0.74, 95% CI= -1.86 - -0.09), learning (β =-0.83, 95% CI = -1.83 - -0.13) and delayed recall (β = -0.90, 95% CI= -2.11- -0.10) when controlling for education.
Conclusions: The relationships between frailty severity and measures of executive function, learning and memory were statistically mediated by poor sleep quality. Interventions to improve sleep quality may be promising avenues to prevent or potentially reverse cognitive decline in frail older adults.
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K. KAUZOR, A. FLOWERS & J. RAZANI. Functional Decline in AD and MCI Over Two Years as Compared to Normal Controls.
Objective: Individuals with cognitive impairment experience varying degrees of functional decline over time. The purpose of this study was to assess functioning in Alzheimer's disease (AD), Mild Cognitive Impairment (MCI) and normal controls (NC) over a two-year period.
Participants and Methods: As part of an ongoing, longitudinal study, a total of 39 individuals (AD= 12; MCI= 10; NC= 17) participated three consecutive years. Patients were recruited from VA medical centers and the UCLA Alzheimer's Disease Research Center and entered our study with a diagnosis. Normal controls were either spouses of patients or were recruited from the greater Los Angeles community.
All participants were administered the Direct Assessment of Functional Status (DAFS), an observation-based evaluation of various functional domains, including orientation, communication, transportation, financial and shopping skills.
Results: Two separate difference scores were created (Year 1 –Year 2 and Year 2 – Year 3) to capture change over time.
Several ANOVAs evaluated the difference scores among the three diagnosis groups in order to assess functional decline over time. Overall, significance was found among the groups on the following outcomes of the DAFS: total score, F (2, 35) = 3.97, p= .03, communication, F (2, 35)= 7.17, p= .002, and shopping, F (2, 35)= 3.87, p= .03. Specifically, results indicated that from Year 1 to Year 2 those with AD experienced greater decline on overall DAFS total score, communication skills and shopping abilities relative to NC. Additionally, from Year 1 to Year 2 AD shows greater decline relative to MCI. as compared to the NC group. Finally, the analysis revealed that AD had great declines from Year 2 to Year 3 in communication skills, relative to NC, but not MCI, F(2, 36)= 3.66, p= .04.
Conclusions: The current results demonstrate greater functional decline in specific domains in AD relative to NC and in some areas more so than MCI.
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D.A. KELLY, M. ABRAHAM, M. SEIDENBERG, J.L. WOODARD, K.A. NIELSON, J. SMITH, S. DURGERIAN & S. RAO. Effect of APOE ε4 Allele and Family History on Five-Year Longitudinal Structural Brain Volumes in Cognitively Intact Elders.
Objective: The *APOE* ε4 allele and a family history (FH) of Alzheimer's Disease (AD) are considered risk factors for the development of AD. Few studies to date have examined the independent and combined influence of these two risk factors on structural brain volumes over time. The purpose of this study was to examine the combined and individual influence of FH and the *APOE* ε4 allele on the trajectory of structural brain volumes over time in cognitively intact older adults.
Participants and Methods: 114 (ages 65-85) cognitively intact elders were divided into four groups based on the presence or absence of FH and the *APOE* ε4 allele: Low Risk (no FH or ε4 allele, n=35), FH Only (n=33), ε4 Only (n=15), and High Risk (FH and ε4 allele, n=31). Linear Mixed Effects (LME) longitudinal analyses were conducted to model the effect of the ε4 allele and FH on ventricular, hippocampal, and grey matter volumes over three intervals (baseline, 18 months, 5 years). To control for multiple comparisons, False Discovery Rate (FDR) correction procedures were applied to all LME analyses.
Results: At baseline, there were no significant differences between groups in any volumes. Over five years, the ε4 Only group had significantly more ventricular expansion and cortical grey matter atrophy than the Low Risk and FH Only groups. Although not surviving FDR correction, the High Risk group showed a trend toward more right lateral ventricle expansion than the Low Risk group and more right cortical grey matter atrophy than the FH Only group.
Conclusions: Previous studies at the pre-clinical stage have produced mixed results as to the risk of FH on structural volume changes. Our findings show a minimal impact when FH alone is considered, while the ε4 allele was associated with volume decline. Further, adding FH to ε4 did not show a combined risk on volume change. We suggest that the FH construct requires further differentiation such as medical history, lifestyle, and environmental factors for a better understanding of FH effects on brain changes.
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A.Z. KRAAL, J. LUCHSINGER, J.J. MANLY, A.M. BRICKMAN & L.B. ZAHODNE. Emotional Support and Cognition among Older Adults with Uncontrolled Diabetes.
Objective: The role of emotional support in health outcomes is uncertain, particularly among older adults with complex medical conditions. Older adults with uncontrolled diabetes, indexed by chronically elevated glycated hemoglobin (HbA1c), are at particularly high risk of multi-morbidity and cognitive impairment, but associations among emotional support, diabetes control, and cognition are scarce. This study examined whether diabetes control moderates the association between emotional support and processing speed, a cognitive domain adversely affected by diabetes. Based on evidence that older adults with poor diabetes control are more vulnerable to health risk factors, we hypothesized that they may also be more sensitive to potential protective factors, such as emotional support.
Participants and Methods: Cross-sectional data from 71 participants from the Washington Heights Inwood Columbia Aging Project with uncontrolled type 2 diabetes (HbA1c ≥ 7.5%) were used. Self-reported emotional support was assessed with the NIH Toolbox. Processing speed was a composite score from the Color Trails Test. SPSS PROCESS quantified the interaction between emotional support and HbA1c on processing speed, controlling for demographics, depressive symptoms, and diabetes treatment.
Results: Emotional support was associated with better processing speed only among individuals with very high HbA1c (1 SD above the mean ≥ 10.11%).

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Conclusions: Our findings suggest that greater emotional support may be beneficial for cognition among older adults with poorest diabetic control. Emotional support may confer cognitive benefits by providing relief from adjustment-related distress associated with particularly complex medical conditions. Given the cross-sectional data, an alternative explanation is that older adults with better processing speed and worse diabetic control are more socially engaged and report better emotional support. Thus, longitudinal data are needed to confirm the direction of associations.

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R. KRAUT, M. IZZETOGLU, K. YE & R. HOLTZER. The efficiency of pre-frontal cortex activation during dual-task walking is compromised in older adults with fear of falling.

Objective: Fear of Falling (FOF) is common and associated with poor mobility in aging but whether FOF influences brain activation during walking has not been reported. Brain inefficiency exists when higher brain activations are associated with equivalent or worse performance. Improved brain efficiency can be demonstrated when brain activation is reduced after practice. Here, we determined the effect of FOF on the efficiency of brain activation: 1) during walking under Single-Task-Walk (STW) and Dual-Task-Walk (DTW) conditions; 2) after practice involving repeated STW and DTW trials.

Participants and Methods: Older adults with FOF (n=20; mean age=79.35±6.25ys; %female=65) and controls (n=58; mean age=76.88±6.42ys; %female=44.8) were included. Walking was assessed under STW and DTW conditions. Functional Near-Infrared Spectroscopy (fNIRS) was utilized to quantify HbO_2 in the prefrontal cortex (PFC) while walking. Burst measurement included three repeated trials for each experimental condition.

Results: FOF was associated with an overall slower walking speed (estimate=-10.932; $p<0.01$). Linear mixed effects model revealed that HbO_2 increased from STW to DTW (estimate=0.648; $p<0.01$) conditions. The Task by FOF interaction was significant such that individuals with FOF exhibited greater increase in HbO_2 from STW to DTW compared to controls (estimate=0.196; $p<0.05$). There was a significant decline in HbO_2 over repeated DTW trials (trial 1 to 2: estimate=-0.325; $p<0.01$; trial 1 to 3: estimate=-0.254; $p<0.01$). FOF moderated this change; specifically, individuals with FOF exhibited an attenuated decline in HbO_2 from the first to the second DTW trials (estimate=0.274; $p<0.05$). The change in HbO_2 over repeated STW trials was not significant and was not moderated by FOF.

Conclusions: FOF was associated with higher and inefficient PFC activation during DTW in older adults. Furthermore, individuals with FOF demonstrated a delay in improving DTW PFC efficiency after practice.

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C.A. LINDBERGH, K.B. CASALETTO, M. ALTENDAHL, S.M. WALTERS, A.M. STAFFARONI, J. HINMAN, C. DECARLI, J. KRAMER & F. ELAHI. Endothelial Dysfunction Predicts White Matter Hyperintensities in Old Age.

Objective: Vascular endothelial dysfunction is posited to be an early pathological change in a pathway ultimately leading to cerebrovascular injury with important functional consequences. The present study aimed to determine whether endothelial dysfunction occurs upstream of white matter hyperintensities (WMH), brain injuries commonly associated with cerebrovascular disease. We hypothesized that novel plasma markers of endothelial dysfunction would demonstrate significant associations with increases in WMH in an aging cohort.

Participants and Methods: Magnetic resonance imaging (MRI) data were acquired in a cohort of 162 older adults (mean age=75) longitudinally followed across the spectrum of functional status and cerebrovascular disease. A theoretically-driven index of endothelial dysfunction was derived from a composite score of relevant plasma proteins (VEGF-D, PIGF, and bFGF) shown to upregulate with vascular-related neural damage. Longitudinal models evaluated predictive utility on WMH levels across an average of 5 years.

Results: Markers of endothelial dysfunction correlated with age (r=0.12, p=0.03) and increased over time (b=0.01, p=0.03), suggesting sensitivity to change. Controlling for age, functional status (Clinical Dementia Rating), education, and sex, elevated baseline endothelial dysfunction predicted more rapid accumulation of WMH over time (β=0.239, p=0.003). In a subset of participants with MRI obtained concurrently with the blood draw (n=95), the effect remained significant upon controlling for baseline levels of WMH (β=0.232, p=0.009).

Conclusions: Higher baseline plasma levels of endothelial signaling proteins predict more rapid progression of WMH injury over time, suggesting that vascular endothelial dysfunction may occur upstream of vascular-induced structural brain injury, a major contributor to age-associated cognitive impairment.

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M. LUCAS, M.E. WAGHSUL & R. HOLTZER. Moderating Effect of White Matter Integrity on Intraindividual Variation During Verbal Fluency in Older Adults.

Objective: Intraindividual variability (IIV) in cognitive performance offers incremental predictive information regarding cognitive decline beyond central tendency measures and is considered a measure of executive control. In aging, brain white matter integrity (WMI) declines and there is increased IIV in cognitive performance. Involvement of the dominant frontal cortex in letter fluency and the temporal cortex in category fluency has been well established, however, there is a paucity of research examining the neural correlates of IIV during verbal fluency. Our aim was to examine whether WMI, both whole-brain and in tracts-of-interest, moderated IIV during verbal fluency. We hypothesized poorer WMI would be related to increased IIV during letter and category fluency.

Participants and Methods: 69 cognitively-healthy older adults (mean age=74.88, 50.7% women) underwent Diffusion Tensor Imaging to calculate Fractional Anisotropy (FA) as a gauge of WMI and were administered the Controlled Oral Word Association Test. For each one-minute verbal fluency trial, word production was demarcated by 20-sec intervals to determine individual performance slopes, which operationalized IIV.

Results: Linear mixed effects model (LMEM) showed significant negative slopes indicating word production declined during the course of letter ($p<.001$) and category fluency ($p<.001$). LMEM showed FA in the left superior longitudinal fasciculus (SLF_{LEFT}) moderated the change in word production over the course of letter fluency ($p=.022$), with lower FA associated with greater decline in word production over time. This effect remained after accounting for significant covariate effects of age ($p=.025$) and education ($p<.001$). There were no significant effects of the SLF_{RIGHT} FA during letter fluency, nor whole-brain FA, SLF_{LEFT} FA or SLF_{RIGHT} FA during category fluency.

Conclusions: Results suggest a lateralized effect where poorer WMI in the SLF_{LEFT} was associated with greater variability (i.e., slope of word generation) in letter fluency.

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M. MCDONNELL, M. MECHURE, W. HOCHBERGER, L. TAYLOR, B. STEURY & V. ZIZAK. The Influence of Ethnicity and Education on Cognitive Performance When Comparing Standard and Regression Based Norms in Older Adults.

Objective: As the population of older adults grows, it continues to become more diverse. The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) is a brief battery designed to assess functioning across cognitive domains; however, the normative sample may not capture the diversity exhibited in the older adult population. Although Duff and Ramezani (2015) established regression-based norms that incorporate ethnicity and education in evaluating RBANS performance, differences between the revised versus standard norms is unclear. We hypothesized that accounting for these demographic factors less related to brain functioning, classification of cognitive performance would be more stringent for the RBANS than the Duff Norms.

Participants and Methods: The RBANS was administered to geriatric Veterans referred for neuropsychological evaluation (n=99; age 65-96, *M*=73.13, *SD*=7.3; 64% Caucasian; 19% African American; 17% Other). RBANS performance was evaluated according to the provisions established by both the RBANS and Duff norms to examine differences in classifying cognitive performance as a function of ethnicity and education.

Results: Repeated Measures ANCOVAs revealed significant main effects indicating the RBANS norms yielded significantly lower scores compared to the Duff norms. Large effect sizes were found for the interaction between cognitive performance and ethnicity for Immediate Memory (d = 1.24), Visuospatial (d = 0.90), Language (d = 1.60), Attention (d = 2.78), Delayed Memory (d = 2.27), and Total Scale Score (d = 2.25), as well as between cognitive performance and education for Immediate Memory (d = 1.56), Attention (d = 1.73), Delayed Memory (d = 0.93), and Total Scale Score (d = 1.15).

Conclusions: These results suggest there is a significant discrepancy between the RBANS and Duff norms, as the RBANS is more likely to classify patients as impaired compared to the Duff norms, potentially leading to misdiagnosis of patient deficits.

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T. MCGIBBON, A. NEMES, A. OPRE & A. JANSARI. Detecting preclinical signs of MCI or dementia in healthy elderly populations: A new paradigm assessing rapid forgetting.

Objective: Accelerated long-term forgetting is being increasingly reported in groups outside the original documentations in patients with temporal lobe epilepsy. One such group is healthy elderly individuals who perform normally on clinical assessments but a proportion of whom nonetheless go on to develop Mild Cognitive Impairment (MCI). A number of methodological differences have been identified which have led to the variance in findings and subsequent interpretations.

Participants and Methods: Twenty-six healthy elderly (65-80yrs) Romanian participants who importantly did not self-report memory problems were compared to 43 education-matched younger (20-30 yrs) participants on an unrelated word-pair recall task. To reduce retrieval practice of over-learned items, criterion-to-learning was applied to word pairs individually rather than to the entire set as a whole; further, different matched sets were used to test recall at three different delays, 5, 30 and 55 minutes after learning-to-criterion had been achieved.

Results: Significant main effects of delay ($F(2, 121)=69.08$, $p<0.001$, $\eta_p^2=0.51$) and group ($F(1, 67)=40.71$, $p<0.001$, $\eta_p^2=0.34$) were found, as well as a significant interaction ($F(2, 121)=11.89$, $p<0.001$, $\eta_p^2=0.15$) indicating that the elderly group experienced greater forgetting than the young group. Analysis of number of trials needed to reach criterion in the elderly group revealed a bimodal distribution, so this group was separated into 'fast' and 'slow' learner' groups. Further analysis revealed that while the fast learners were unimpaired at all three time points, the slow learners were the ones driving the overall age effect ($F(4,118)=6.93$, $p<0.001$, $\eta_p^2=0.19$).

Conclusions: Our findings have implications for future studies in terms of methodology, consideration of variability when working with older participants and the potential development of a test for detecting MCI or Subjective Cognitive Impairment to identify those at risk of developing dementia at earlier time points than is currently possible.

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V.M. MEDINA, J. VONK, C. ROMERO, R. CABO, J. HABEGGER, K. LOUIE, E. ALLOCCO, A.M. BRICKMAN & J.J. MANLY. Education Moderates the Relationship between ApoE e4 and Memory in Older African Americans.

Objective: The ApoE e4 allele is a well-known risk factor for cognitive decline due to Alzheimer's disease (AD). Previous research argues that higher education helps to preserve cognition in older adults with AD pathology because of its key role in cognitive reserve and resilience. To test this theory, we hypothesized that the effect of the ApoE e4 allele on cognition among older African Americans would be buffered by higher educational level.

Participants and Methods: Participants were 391 older African Americans (age m = 69.3, SD = 8.0), of which 156 were ApoE e4+ and 235 were e4-. Memory was assessed with a memory retention score calculated as the delayed recall score of the California Verbal Learning Test (CVLT) divided by the score on the last learning trial. We used multiple linear regression models to examine the relationship between ApoE e4 status and memory, adjusting for age, sex/gender, and quality of education, with years of education (up to high school and beyond high school) as a moderator.

Results: Participants with the ApoE e4 allele (β = -.104, p = .032) and lower education (β = .122, p = .023) had lower memory scores, independent of covariates. Education buffered the effects of the ApoE e4 allele, such that there was no impact of e4 status on memory among participants with more than a high school degree (β = .169, p = .068).

Conclusions: Our findings suggest that genetic impacts on late-life cognition can be modified by environmental factors such as education. These results are consistent with the framework of cognitive reserve such that cognitively challenging activities and acquisition of skills and knowledge after high school increase the capacity to maintain cognitive function despite high risk for impairment.

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A. MENSING, Y. GAZES, Y. GU & Y. STERN. Socioeconomic Status Predicts Cognition Across the Lifespan.

Objective: To assess the impact of socioeconomic status (SES) on cognition throughout the life-course.

Participants and Methods: A group of 387 subjects ranging from 18 to 80 years old were included in this study. All subjects were tested using a standard neuropsychological battery assessing cognition in four domains (fluid reasoning, memory, vocabulary, and processing speed & attention). Demographic variables, including education and occupation, were collected for all subjects. Using the Hollinghead Index, a SES score was calculated for each subject as a weighted composite of years of education and occupation. A general linear model was used to predict scores in each cognitive domain based on SES with age and gender included in the model as covariates.

Results: SES significantly predicted cognitive scores in each domain (fluid reasoning (B=.022, p<.000), memory (B=.013, p=.002), vocabulary (B=.033, p<.000), and processing speed & attention (B=.009, p=.012). Furthermore, a significant interaction effect between gender and SES was detected for vocabulary ($F(2,380)=4.897$, $p=.008$)) with SES having a greater effect on vocabulary scores for females than for males but no such interaction was observed for fluid reasoning, memory, or processing speed & attention. Additionally, while it is well known that advanced age negatively correlates with cognitive performance in nearly

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all domains, factoring in SES as a mediator reveals that SES provides a significant mediation effect between age and cognitive performance ($p<.05$ for all domains).
Conclusions: These results support the hypothesis that SES plays an important role in maintaining cognitive performance throughout the life-course. Additional consideration should be given to this relationship when considering public health strategies for promoting healthy cognitive aging. Further research to assess the mechanisms by which SES affects cognition would yield stronger recommendations.
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Z.L. MESTRE, J. OSUNA, A. BISCHOFF GRETHE, K. BOUTELLE & Z.Z. ZLATAR. Effects of saturated fat on brain aging and cognition in healthy older adults: a pilot study.
Objective: As the aging population is expected to more than double in the United States by the year 2050, interventions to help maintain brain health and cognitive functioning in older adults are critical. Exercise has been shown to improve brain health in older adults. Yet, few studies have investigated the combined impact of diet and exercise on brain health. This pilot study sought to examine the effects of a neuroprotective diet (Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND)) and exercise intervention on hippocampal volumes and memory scores in older adults.
Participants and Methods: Five cognitively normal older adults were recruited from a retirement community in Carlsbad, California. Participants underwent a comprehensive neurocognitive battery, 24-hour recall dietary assessment (to measure saturated fat consumption), and a magnetic resonance imaging scan (to measure brain volume) before and after completing a 12-week group format diet and exercise intervention. During the intervention, participants received weekly individual feedback on their exercise goals and attended weekly groups to ensure adherence to the MIND diet. Freesurfer software was used to extract hippocampal volumes. Spearman correlations examined the strength of pre to post intervention changes on hippocampal volumes and memory performance.
Results: Reduction in saturated fat consumption pre-post intervention was significantly associated with better performance on tasks of episodic short-term memory (rho=-.97, $p<0.01$) and working memory (rho=-1, $p<0.01$). There was no significant correlation between reduction in saturated fat consumption and hippocampal volumes, however a medium effect size was observed (rho=-.3).
Conclusions: These preliminary results support the need for further research on the combined effects of diet and exercise on healthy brain aging and cognition in older adults. If replicated, these results could offer new insight for healthy aging interventions.
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C. MEWBORN, C. LINDBERGH, B.R. HAMMOND, L. RENZI-HAMMOND & L.S. MILLER. Limited Effects of Lutein and Zeaxanthin Supplementation on Brain Morphology in Older Adults.
Objective: A growing literature emphasizes the importance of lifestyle factors, including nutrition, in successful aging. This study examined if one year of supplementation with lutein (L) and zeaxanthin (Z), two carotenoid nutrients with known antioxidative properties and cognitive benefits, impacted structural brain outcomes in cognitively healthy older adults using a year-long randomized controlled design.
Participants and Methods: Participants aged 65-87 years (M = 71.3, SD = 5.96) were randomized to take a 10 mg L and 2 mg Z supplement (N = 29) or a visually-identical placebo (N = 14) once daily for twelve months. L and Z concentrations were measured using macular pigment optical density (MPOD), and structural brain outcomes, focusing on global and frontal-temporal regions-of-interest (ROIs), were acquired using both MRI and DTI technologies. We hypothesized the supplement group would increase, maintain, or show attenuated loss in ROIs and global brain measures while the placebo group would show expected, age-related declines in brain structural integrity over the course of the trial.
Results: While we found significant age-related declines for frontal and temporal gray and white matter volumes across both groups, only minimal differences were found between the supplement and placebo groups. No age-related changes or group differences were found in the DTI measures. However, exploratory analyses showed that individuals who responded better to supplementation (i.e., increased MPOD) showed less decline in global and prefrontal gray matter volume than supplement non-responders (i.e., no change or decreased MPOD), even when controlling for age and baseline MPOD.
Conclusions: Results showed that one year of L and Z supplementation had overall limited effects on the structural brain integrity of cognitively healthy older adults; however, there may be a subsample of individuals for whom supplementation provides greater benefits and attenuates age-related gray matter volume loss.
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L.S. MILLER, M. GOGNIAT, C. MEWBORN, J. BUCH & B.R. HAMMOND. Effects of Varying Light Intensity on Brain Activation Assessed Using Functional Neuroimaging.
Objective: Objective: We present preliminary results of functional brain changes of bright light filtration using functional MRI. We studied the impact on human visual processing of multiple filter strengths compared to no filtration.
Participants and Methods: Participants and Methods: 24 participants (12 young/12 older) were exposed to bright white (xenon-based) light while performing a visual acuity task in a 3T MRI scanner. Filters attenuated light based on overall transmission (T) from no filtering (~ 30K lumens) to 92%T, 66%T, 40%T and 14%T. We additionally analyzed differences between no filter and blue-light blockage. This first study focused on overall filtering effects irrespective of task. Contrasts were standard block based, each filter minus no filter (full light). MRI T2* sequences were used for fMRI acquisition combined with 3D T1 structural scans. Standard preprocessing methods were used. All participants received exposure (randomized) to all conditions.
Results: Results: Whole brain activation differences across filters of varying transmission attenuation were small. Using conservative Family Wise Error correction, no differences survived correction with the exception of the blue-light filter which showed significant positive and negative activation differences in the older but not younger group, depending on brain region. Liberal thresholding (uncorrected at .01 or .001) provided evidence for a transmission dose effect with greater filter transmission attenuation resulting in greater differences in the total group. Generally, greater differences were seen in the younger group. However, with liberal thresholds, significant activation in both groups was found comparing blue-light filtering to no filtering, greatest for the older group.
Conclusions: Conclusion: These data indicate that varying light illumination can be evaluated using functional MRI but that differences are modest. Of interest, blocking out specific wavelengths such as those associated with the blue light range can be more robustly seen
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R. MIS & T. GIOVANNETTI. Factors Promoting Financial Literacy in Older Adults.
Objective: Financial literacy is recognized as one of the first domains of daily living to be affected by aging and neurodegeneration. However, financial literacy remains a poorly understood construct, with conceptual models including cognition, personality, and socioeconomic status

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(SES) and some models distinguishing actual financial abilities from perceived financial abilities. This study examined factors contributing to both actual and perceived financial literacy in older adults.
Participants and Methods: Data from 2,868 older adults (M age 71.2±.9) in the Wisconsin Longitudinal Study was utilized. Participants answered 12 true-false items on financial concepts and rated their confidence on each response. Pearson correlations examined the relation between actual and perceived financial literacy. Separate multiple regression analyses were conducted for accuracy and confidence with SES (education, income), sex, cognition, and five-factor personality measures as predictor variables.
Results: Accuracy was moderately correlated with confidence (r=.42, p<.001). SES explained 9% of variance in financial accuracy [education (β=.24), income (β=.12), $F(2,2865)=140.06$, p<.001], though adding cognition (β=.22), sex (β=-.11), and personality factors (openness β=.04) with SES [education (β=.13), income (β=.10)] explained an additional 5% of variance [$F(9,2858)=52.78$, p<.001]. For financial confidence, our model explained 10% of the variance ($F(9,2858)=33.54$, p<.001) with income (β=.12), education (β=.09), sex (β=-.14), cognition (β=.12), extraversion (β=.06), and conscientiousness (β=.06) as significant predictors (all p's<.05).
Conclusions: Financial literacy is a multidimensional construct that depends on level of income and education as well as cognitive and personality factors. Discrepancies between accuracy and confidence may be best explained by personality variables and suggest that some healthy older adults (i.e., low accuracy, high confidence) may lack insight into their need for assistance managing finances effectively.
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K. MONAHAN. Nutrition and its Relation to Cognition: Proportional Macronutrient Consumption and Cognitive Function among Older Adults.
Objective: The objective of this study was to attempt to identify possible causal or preventive factors to cognitive decline. It explored links between naturalistically observed nutrient consumption and cognitive function in a convenience sample of older adults.
Participants and Methods: The sample (n=90) consited of individuals recruited at eight independent living facilities within close proximity in the state of New York. Participants were >55 years of age and were absent of any diagnosed neurologic disorders, such as Alzheimer's, and other disabilities that may affect cognition. Upon enrollment, subjects were asked to fill out a one-day dietary intake form, which required them to record all food and drinks consumed within a three-day period. The study focused primarily on MCI, but portions included the trail-making task, digit span, the Rey-O complex figure, and the Rey Auditory Verbal Learning Test, among others. Hypotheses and analyses were contigent upon prior research studies in the literature. The nutrients reviewed included protein, carbohydrates, fat, saturated fat, Omega 3 and 6, Vitamin D, and sugar. Total caloric intake was also investigated.
Results: Results revealed a correlation between greater sugar intake and incidence of MCI (r=.45, p=.003), and slower motor function in both dominant (r=.31, p=.046) and non-dominant hands (r=.43, p=.004). Results also revealed that low caloric intake yielded higer incidence of MCI (t=2.09, p=.04).
Conclusions: Results suggest that sugar and inadequate caloric consumption may be harmful to older adult cognition and mobility. The increaed sugar intake found in individuals with MCI could be attributed to disinhibition resulting from an already present cognitive decline. These findings may also suggest that sugar is negatively affecting cognition in the present population. Additionally, increased caloric consumption may be beneficial to brain health as it may provide individuals with increased energy and contribute to adequate metabolic health and nutrient status in the brain.
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G.G. MONCRIEF, A. WATTS, R. FALLOWS & A. MULLANE. Preliminary Assessment of Judgment in Neuropsychological Testing with Older Adults: Associations with Education Attainment and Performance-Based Functional Measures.
Objective: To better understand the assessment of judgment in older adults, associations between the Test of Practical Judgment (TOP-J), educational attainment, and scores on performance-based functional measures were examined in a clinic sample of older adults.
Participants and Methods: The sample consisted of 86 participants over age 55 previously evaluated at an outpatient neuropsychology clinic divided into three groups based on clinical diagnosis (dementia, mild cognitive impairment [MCI], or no cognitive diagnosis). Because TOP-J total scores and education level for all three groups were not normally distributed, nonparametric Spearman's rank-order correlations were conducted to examine relations between education level, TOP-J total scores, Pillbox Test errors, Texas Functional Living Scale (TFLS) scores, and group membership.
Results: A significant moderate association between TOP-J scores and educational attainment was found only in the MCI group, $r_s(34)=.42$, p=.01. Significant moderate associations between TOP-J scores and the Memory and Communication scales of the TFLS were demonstrated in the subset of the sample who completed the TFLS, $r_s(58)=.41$, p<.01 and $r_s(57)=.52$, p<.001, respectively. Pillbox errors, TFLS Money and Calculation, TFLS Time, and TOPJ scores were not significantly correlated.
Conclusions: Higher educational attainment may be protective of judgment capacity in older adults with MCI. Previous research has demonstrated correlations between TOP-J scores and standard measures of measures of executive functioning, language, and memory. The finding of significant associations between the TOP-J and performance-based functional assessment of memory and communication demonstrates moderate convergent evidence of validity with theoretically related constructs.
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K.J. MURPHY, A. ALTSCHULER, L. HASHER, K. DUPUIS, D. HOGAN, E. HOWARD, G. ROWE, S. SWAMINATHAN, A. SZCZEPURA, L. TSOTSOS, W. WITTICH & F. XIE. Arts-based Interventions and Wellness Promotion in Older Adults.
Objective: The opportunity for enjoyable recreation has been associated with enhanced well-being and reduced dementia risk in older adults. This project was conducted to determine if engagement with an arts-based online recreation activity could influence positive health outcomes in older adult users with and without mild cognitive decline.
Participants and Methods: Ten older adults, 7 with estimated age-normal cognition and three with mild cognitive impairment participated in a 6 week recreation intervention that involved engaging with an arts-based online activity, for approximately 45-minutes, twice weekly. The online recreation opportunity involved learning, solving puzzles, and socializing with storytelling and discussion around a user selected artwork. Pre-test and post-test measures of mood, health resource utilization, social network size, and open-ended cognitive measures of problem solving and autobiographical memory were administered.
Results: Results showed improvement in mood status ($t(9)$ = 2.37, p <.05, d =0.75, 95% C.I.[0.028, 1.520]) and a trend toward reduced health utilization (group reported total of 9 fewer doctor visits) post-intervention. No significant influence was observed on measures of social network size or on the cognitive measures employed. Feedback about the experience indicated high satisfaction and desire for further opportunity to engage with the online activity.

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Conclusions: These pilot data add to the literature on the societal importance of ensuring access to enjoyable recreation as a means of promoting wellness in older adults. The findings also demonstrate the importance of further investigation into the potential for secondary health outcomes, such as cognitive benefits. Further, the data suggest arts-based recreation may benefit the health economy by meeting seniors' needs for meaningful mental and social engagement.
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D.A. NATION, A. TAN, E.C. MCINTOSH, B. YEW, J. JANG, S. DUTT, A. BLANKEN, J.K. HO, K. RODGERS, A. GAUBERT & Y. LI. Early Endothelial Progenitor Cell Proliferation and Senescence is Related to Better Neurovascular and Neuropsychological Function in Older Adults.

Objective: Early endothelial progenitor cells (eEPCs) may represent a protective factor for cerebrovascular health in aging. Thus, we hypothesized that better eEPC function, including greater *in vitro* proliferation and less senescence, may be related to better neurovascular and neuropsychological function.
Participants and Methods: Older adults (N=49) underwent neuropsychological testing, perfusion MRI and venipuncture, and were diagnosed as cognitively normal (CN) or mild cognitive impairment (MCI). Peripheral blood mononuclear cells were cultured in colony forming unit (CFU)-Hill medium to yield CFUs and endothelial-like cells (ECs) as markers of eEPC proliferation. Staining with β-galactosidase (β-Gal) indicated senescence. Pearson correlations and multiple regression evaluated whether cell markers related to cerebral perfusion and neuropsychological function (composites of memory, attention/executive, language, and visuospatial functions). Voxel-level regression examined cerebral perfusion in relation to cell markers.
Results: Among CN older adults (n=38), those with greater *in vitro* CFU proliferation exhibited better memory (R=.49, P<.01) and language (R=.44, P<.01) function, and those with more ECs showed better attention/executive function (R=.48, P<.01), language ability (R=.48, P<.01) and visuospatial ability (R=.54, P<.01). Findings were significant after controlling for age, sex and education (P's<.05). No significant relationships were found in MCI (n=11). In the total sample, those with greater β-Gal staining exhibited lower cerebral perfusion, particularly within inferior frontal and posterior cingulate regions (P<.001).
Conclusions: Greater eEPC proliferation is linked to better neuropsychological function in asymptomatic older adults, possibly due to a relationship with neurovascular health. In support of this hypothesis, older adults exhibiting increased eEPC senescence show lower cerebral perfusion. Longitudinal studies are needed to determine the predictive value of eEPCs in cognitive decline.
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T. NEAL, J.S. RABIN, A. SCHULTZ, K. JOHNSON, R. SPERLING & T. HEDDEN. Multiple Brain Markers Indicate Risk of Progression on the Clinical Dementia Rating Scale in Clinically Normal Older Adults.

Objective: How do brain markers associated with age-related changes in cognition influence the rate at which cognitively normal individuals (Clinical Dementia Rating=0) progress to mild functional impairment as indicated by a CDR of 0.5? Here, we expanded on prior work by simultaneously examining multiple brain markers and cognitive domains as predictors of progression.
Participants and Methods: Participants were 254 clinically normal older adults (M=73.5 years old) from the Harvard Aging Brain Study. Participants were assessed at baseline on magnetic resonance imaging markers of gray matter thickness and volume, white matter lesions, fractional anisotropy, and resting state functional connectivity; positron emission tomography markers of glucose metabolism and amyloid burden; cognitive factor scores of episodic memory, executive function, and processing speed performance, and change over time in these cognitive scores. Elastic net models were used for feature selection and cox regression models were used to assess the time to progression to CDR of 0.5. All models included covariates for age, sex and education.
Results: Sixty-three participants (24.8%) progressed to CDR=0.5 over an average follow-up of 3.75 years (range: 1-6). Decreased functional connectivity of the default network, low hippocampal volume, low entorhinal thickness, high amyloid burden, and lower baseline memory performance significantly contributed to the rate of progression while controlling for contributions of other biomarkers, cognitive measures, and covariates.
Conclusions: Consistent with prior findings, amyloid burden and hippocampal volume influenced progression to a CDR global score of 0.5. Resting state functional connectivity of the default network and entorhinal thickness additionally influenced progression. These brain markers were independently associated with progression beyond the predictive value of baseline or change in cognitive performance.
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C.M. NGUYEN, D.A. LOWE, C. BLOCK, C. COPELAND, J. SCOTT & J. LINCK. The Effects of Social Integration on Cognitive Functioning among Older Adults.

Objective: The concept of cognitive reserve suggests that genetic and environmental factors, such as educational or occupational attainments, healthy behaviors, or participation in cognitively stimulating activities, may supply reserve that allows some people to cope with progressing neurodegenerative disease pathology better than others. Previous research has linked perceived social support with better cognitive functioning among older adults. This study explored whether perceived social support and/or social integration contribute to neurological outcomes, beyond the effects of established cognitive reserve factors.
Participants and Methods: A sample of 151 elderly patients completed a questionnaire exploring cognitive reserve factors as part of a comprehensive test battery at an outpatient neuropsychology clinic (M_{age} = 71.4 + 7.4; $M_{education}$ = 13.7 + 3.6; 58% female). Perceived Social Support is defined as the belief that others would be responsive to one's needs through caring, validation, and/or providing information, assistance, or tangible resources. Social Integration is defined as the presence or absence of membership in groups, such as churches, clubs, and voluntary organizations.
Results: A hierarchical regression model revealed that after accounting for demographic factors (age, gender, education), mood, cognitive reserve (Bilingualism, Musical Abilities, Exercise) and social resources variables (Social Integration, Perceived Social Support, Satisfaction of Support, number of close friends), only the Social Integration significantly predicted neurocognitive functioning (Repeatable Battery for the Assessment of Neuropsychological Status Total scores; β = .381, p = .008).
Conclusions: A deficient social environment has been linked to a host of negative outcomes such as poor physical health and increased mortality. Results from the current study confirm prior findings of a relationship between social integration and preserved neurocognitive functioning in aging. Implications are discussed.
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J. NITIS, Y. STERN & Y. GU. Occupational Complexity Informs Cognitive Abilities in Healthy Adults.

Objective: Previous research showed that the complexity, or mental demands, of an occupation may be related to observable cognitive differences. Occupational complexity has been defined in terms of complexity of work with data, people, and things. Normal aging is associated with

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some level of cognitive decline, which can be characterized by four latent variables representing fluid reasoning, perceptual speed, memory, and vocabulary. This study aimed to examine the association between the different types of occupational complexity and these latent cognitive variables in healthy adults.
Participants and Methods: Data was collected from 391 cognitively healthy subjects, aged 20 to 80. Self-reported occupation, which was defined as the position worked for the longest duration, was matched to U.S. Census Bureau Dictionary of Occupational Titles for a quantification of complexity of work with data, people, and things. The participants also underwent a comprehensive neuropsychological battery from which four normalized summary scores were derived for the latent cognitive variables. Generalized linear models, adjusted for age, sex, education, gender and race/ethnicity, were used to estimate the association between cognitive scores and occupational complexity groups.
Results: We found that higher occupational complexity with data was related to better fluid reasoning (β=-.105, p=.035) and vocabulary (β=-.050, p=.035), while increased occupational complexity of work with things was associated with worse scores on vocabulary tasks (β=.080, p=.016). Stratified analyses by age below or above 65 years showed that the association between high lifetime occupational complexity and cognition was significant only for participants below the age of 65.
Conclusions: This study indicates high occupational complexity with data may confer environment-specific cognitive benefits, which dissipate in the absence of the cognitive demands of this type of labor.
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R.A. NUNEZ, E.C. MCINTOSH, A. HAMMOND, D. NGUYEN, S. PEDRAHITA, D.J. MOORE, M. DAWSON & A.D. THAMES. Mood-Associated Brain Regions Uniquely Predict Successful Aging Above Mood Profiles: Implication of an Underlying Neural Etiology of Successful Aging.
Objective: Determining contributors to successful aging outcomes are becoming increasingly important. Links between mood and successful aging show that more positive mood profiles predict better successful aging outcomes (Keyes & Westerhof, 2012; Reichstadt et al., 2006). While the neural underpinnings of mood and normal aging processes have been well studied, brain regions involved in successful aging require further investigation. This study aims to examine the predictive ability of mood and its associated brain regions on successful aging outcomes in a sample of adults.
Participants and Methods: Sixty-two adults (age range: 23-76; M_{age}=53) provided an estimate of their perceived age, completed questionnaires on depressive symptoms and quality of life (QoL), completed neurocognitive testing; and underwent MRI. Brain regions that have been implicated in mood (e.g., amygdala, frontal cortex, cingulate gyrus; Jalbrzikowski et al., 2017) were extracted from T1-weighted MRI images. An "age discrepancy" score was calculated by subtracting actual age from perceived age, with larger age discrepancies indicating older perceived age compared to actual age.
Results: Bivariate correlational analyses were conducted between age discrepancy, depressive symptoms, QoL, global cognition, and ROIs. Age discrepancy was associated with greater depressive symptoms (r=.45), larger volume of the amygdala (r=.40), hippocampus (r=.31), frontal cortex (r=.32) and cingulate gyrus (r=.39). Lower QoL (r=-.47) was associated with age discrepancy. Global cognition was not significantly correlated with age discrepancy. Multiple regression was utilized to predict age discrepancy from mood, QoL and ROIs. The full model accounted for 45.4% of the total variance in age discrepancy scores, with amygdala volume being the most important predictor of age discrepancy, β=.35, p=.007.
Conclusions: The findings imply that these brain regions might constitute an underlying neural etiology of successful aging that is independent of reported functional outcomes.
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S. OLESON, A.C. BIRDSILL, D. EAGAN, S. KAUR, H. TANAKA, J.N. DAVIS & A.P. HALEY. Dietary polyunsaturated fat and blood-oxygen-level dependent response during a working memory task as a function of APOE genotype.
Objective: Although research suggests PUFA is linked with better executive functioning and reduced risk of dementia, PUFA supplementation studies have yielded mixed results. The apolipoprotein E (APOE) ε4 allele, a genetic risk factor for Alzheimer's disease (AD), is posited to interact with PUFA to affect brain function, and may account for discrepant findings in clinical trials. Assessing blood-oxygen-level dependent (BOLD) response through the use of functional magnetic resonance imaging (fMRI) is a useful technique for identifying early changes in executive function that may be associated with diet. Therefore, the present study aim was to examine the interaction between PUFA and APOE genotype on BOLD response during working memory in midlife
Participants and Methods: Middle-aged participants (36 ε4 carriers and 65 ε4 non-carriers) recorded dietary intake for three consecutive days, and subsequently completed a 2-back verbal working memory task during fMRI.
Results: Significant interactions between APOE and total PUFA (F[8,81]=2.826, p=.008), as well as omega-6 (ω-6) PUFA (F[8,81]=2.826, p=.008), were observed on BOLD response across the working memory network. Specifically, greater total and ω-6 PUFA intake were associated with reduced BOLD response in the right inferior frontal gyrus, left medial frontal gyrus, left inferior parietal lobule, and right superior frontal gyrus in ε4 non-carriers. However, when assessing relative PUFA intake, there was a moderate trend indicating ε4 non-carriers showed greater BOLD response with more balanced intake of ω-3 and ω-6 PUFA compared to APOE ε4 carriers (F[4,85]=2.307, p=.065).
Conclusions: The findings suggest PUFA is associated with brain function differentially according to APOE polymorphism, and additionally, underscores the importance of considering relative intake of PUFA type to clarify understanding of PUFA benefits on brain function. Early dietary interventions that are personalized according to genotype may be a promising strategy for preserving cognitive function.
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J. OSUNA, Z. MESTRE, K.R. THOMAS, C.C. HAYS, L.M. CAMPBELL & C. WIERENGA. The Relationship between Arterial Stiffness, APOE Genotype, and Cognitive Process Scores in Cognitively Normal Older Adults.
Objective: Arterial stiffness has been shown to be a risk factor for cognitive decline in older adults, yet, few studies have examined this association using the gold standard method, Pulse Wave Velocity (PWV). This study aimed to assess the relationships between PWV, apolipoprotein E (APOE) ε4 status, and cognition. Furthermore, we investigated how error scores in conjunction with total correct scores can increase the sensitivity in detecting subtle cognitive changes.
Participants and Methods: 38 cognitively normal older adults (mean age= 74, range=66-85 years) underwent comprehensive neuropsychological and PWV testing using a carotid to femoral PWV device. Total and error scores in domains of Executive Function (EF), language, processing speed, as well as verbal and visual memory were examined. Pearson correlations and multiple linear regression models were performed to evaluate the relationship between PWV, APOE ε4 status, and cognition.
Results: After adjusting for age, sex, and body mass index, results showed that PWV significantly predicted more errors on a card sorting task, worse overall performance on a task of delayed visual memory,

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and more intrusion errors on a task of verbal memory. Conversely, total scores on a task of verbal fluency was inversely associated to worse arterial stiffness ($p < .05$). Although APOE genotype did not modify the relationship between PWV and cognition, APOE ε4+ carriers scored significantly lower on immediate recall of verbal memory and had more errors on a card sorting task, relative to APOE ε4- carriers.
Conclusions: Findings suggest that worse arterial stiffness was associated with worse cognitive performance on immediate recall of verbal and delayed visual memory, and aspects of EF. Analyzing error scores may provide a greater sensitivity in detecting early cognitive decline. Future studies should investigate arterial stiffness measured by PWV to further investigate how these effects relate to cerebral blood blow, white matter hyperintensities, and subtle cognitive changes.
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H. PAKRAY & R. HOLTZER. Subjective Experience of Pain Influences Pre-Frontal Cortex Activation Patterns During Walking in Older Adults.
Objective: The prevalence of subjective pain, which increases with age, is associated with a range of adverse outcomes including poor mobility. Subjective pain and attention share overlapping neural networks that include the pre-frontal cortex (PFC). The impact of subjective pain, however, on neural control of walking has not been reported. Using a well-validated dual-task walking protocol and functional-near-infrared spectroscopy (fNIRS) the current study examined the effect of subjective pain on changes in PFC HbO_2 from single to dual-task walking conditions in older adults. Specifically, we hypothesized that worse pain severity and interference would be associated with attenuated increases in HbO_2 from single to dual-task walking conditions.
Participants and Methods: Participants (n=389) consisted of non-demented community-dwelling older adults (mean age=76ys; %female=54). *Walking Task:* There were two single tasks: 1) Single-Task-Walk (STW); 2) Cognitive interference (Alpha). In the Dual-Task-Walk (DTW) condition participants were required to perform the two single tasks at the same time. Pain severity and pain interference were measured by the Medical Outcomes Study Pain Severity Scale and Pain Effects Scale. fNIRS was used to measure changes in PFC HbO_2 during active walking.
Results: Linear mixed effects models (LME) revealed that HbO_2 increased from STW to DTW ($p<0.001$) and from Alpha to DTW ($p<0.001$). Pain severity moderated the increase in HbO_2 from STW to DTW ($p<0.001$) and from Alpha to DTW ($p=.013$). Pain interference also moderated the increase in HbO_2 from Alpha to DTW ($p=.012$). Analyses controlled for age, gender, education, disease comorbidity, and overall level of cognitive function
Conclusions: Worse subjective experience of pain was associated with attenuated PFC activation in tasks of increasing cognitive load in older adults.
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L. PLUNKETT, M. MARTINEZ & M.J. HAMBERGER. Subjective Word Finding Complaints in Healthy Aging.
Objective: Word finding or "naming" difficulty is a common complaint among older adults. Historically, naming has been tested via visual object naming; however, we observed that older adults complain primarily of word finding difficulty in everyday discourse. We hypothesized: 1) if queried, older adults would report more frequent word finding difficulty during conversations than when naming objects, and 2) subjective ratings of word finding difficulty in conversation would correlate with auditory naming performance, whereas ratings of object naming difficulty would correlate with visual naming performance.
Participants and Methods: 379 healthy adults ages 56-90 completed three 7-point rating scales: 1) frequency of word finding difficulty in everyday conversations, 2) frequency of word finding difficulty when naming objects, and 3) distress regarding word finding difficulty. Objective naming measures included: Auditory and Visual Naming tests and the Boston Naming Test. Additional measures included: DRS, WASI-II, DKEFS, RAVLT, and GDS. Paired T tests compared auditory vs visual naming ratings and Pearson correlations assessed relations between subjective and objective measures.
Results: Participants reported more frequent word finding difficulty in conversations than when naming objects ($p<.001$). However, there were no significant correlations between self-rated naming difficulty and naming performance. Further, subjective ratings did not correlate with age, mood or with other cognitive performances.
Conclusions: Subjectively, older adults perceive greater word finding difficulty in everyday conversation than when naming objects. Although this might suggest the use of measures more similar to everyday speech, their subjective ratings did not show greater association with naming performance on auditory than visual naming. However, we speculate that the lack of association between subjective and objective performance may be related to the absence of more severe naming difficulty that would be found in a clinical sample.
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P. PREMNATH, J.A. RAO, G. WISNIEWSKI, G. VEDVYAS, T. OO, A. VEDVYAS, M. SHULMAN, A. MASURKAR, M. SADOWSKI, F. GUILLO BENAROUS, K. MARSH, T. WISNIEWSKI & B. REISBERG. Examining the Relationships Between Gender, Depressive Symptoms, and Cognitive Functioning in Individuals with Subjective Cognitive Decline.
Objective: Research suggests that AD pathology may accumulate in the brain years before cognitive symptoms emerge. Therefore, early detection of AD will become increasingly important once treatments become available. Additionally, research has found that cognitively intact older adults with subjective cognitive decline (SCD) have an increased risk of developing MCI and AD; therefore, examining the factors associated with SCD may shed light on important early biomarkers. Prior research has demonstrated that SCD symptoms are greater, and that the association between SCD and memory is stronger, in females than in males. Yet the moderating role of gender on the relationship between SCD and memory is unclear. Some studies suggest that depression may be a factor in this relationship, as females tend to report higher rates of depression. This study sought to examine whether gender differences exist in the relationship between SCD, depression, and cognitive performance.
Participants and Methods: Participants included 55 cognitively intact (MMSE>25) older adults (39 females, 16 males) from the NYU Alzheimer's Disease Center with SCD (GDS stage 2). Participants completed a battery of neuropsychological tests, the Geriatric Depression Scale, the Cognitive Change Index to assess for SCD, and ApoE genotype.
Results: Results found no gender differences in age, education, neuropsychological test data, ApoE status, or depressive symptoms. However, females reported significantly greater SCD. In females, SCD was positively correlated with depressive symptoms and time to complete Trail Making Test Parts A and B. In males, SCD was not correlated with depressive symptoms or cognitive performance.
Conclusions: These findings are consistent with prior research demonstrating increased SCD symptoms in cognitively intact older females when compared to males. The additional findings that SCD is associated with depression and executive dysfunction (and not memory performance) in females, and not in males, is intriguing and requires further exploration.
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H. RAU, A. VERSTAEN & E.H. TRITTSCHUH. The Healthy Aging Project for the Brain (HAP-B): A Biopsychosocial Approach to Promoting Healthy Brain Aging.

Objective: Empirical data supports the need to target health behaviors to mitigate risk for cognitive decline with age. To address this need, we developed and piloted a psychoeducational health and skills-based group for older Veterans seeking care within the VA. Here we examine initial pilot data to determine whether Veterans report improved health behaviors and quality of life after completing the intervention.

Participants and Methods: Fourteen predominantly male (93%) Caucasian (71%) Veterans aged 51-83 (mean=69) participated in 6 weekly 90-minute group sessions targeting health behaviors known to influence cognitive functioning (cognitive stimulation, social connectedness, sleep quality, and physical activity). Goal setting and daily activity monitoring were incorporated into weekly exercises. Self-report measures were completed at Sessions 1 and 6 to examine change in depressive symptoms (Geriatric Depression Scale), sleep quality (Pittsburgh Sleep Quality Inventory), social support (Social Support Survey Instrument), and subjective well-being (Satisfaction With Life Scale).

Results: Veterans attended 5 out of the 6 groups on average. Ten participants completed all baseline and post-treatment self-report measures. Veteran satisfaction was high. There was a non-significant trend toward improvements on measures of subjective well-being, depressive symptoms, and sleep quality. Written and verbal qualitative feedback indicated that Veterans experienced an increased awareness of healthy behaviors due to the intervention.

Conclusions: Results from this pilot study were mixed, with Veterans reporting both increases and decreases across outcome measures. Qualitative feedback suggests that some Veterans may have endorsed greater difficulties following treatment due to increased insight into health behaviors. Future directions include examining associations between insight and self-reported change in health behaviors, as well as increased sample size.

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C. RAY. Effects of Stress, Sex Differences, and Cognitive Reserve on Cognitive Decline in Healthy Elderly Subjects.

Objective: As the elderly population grows, there is increased interest in slowing cognitive decline and promoting healthy aging. This study examined variables thought to positively impact cognition and potentially stave off decline. Goals were to observe the effects of stress, cognitive reserve, and sex differences on performance in declarative memory tasks.

Participants and Methods: 365 healthy, elderly subjects (aged 65-75 years; 245 female) were recruited from the community.

Subjects' verbal memory, visual memory, executive function, and visuospatial ability was assessed at 2 time points. Regression models analyzed the z-scores of each individual task to determine the effect of stress, sex, and cognition. Four scores were analyzed: the overall factor performance score, the estimated decline score for each domain, the actual performance score for individual tasks, and the estimated decline score for each task.

Results: Stress did not significantly impact task performance or decline scores. Sex significantly predicted performance and decline in verbal memory. Sex, stress, and cognitive reserve all failed to predict performance or decline for visual tasks. Cognitive reserve significantly predicted differences in scores within verbal, executive functioning, and perception domains.

Conclusions: Significant effects of stress on cognitive change were not found. But this does not prove these effects are non-existent: future research using more granualar stress measures may reveal effects.

Small but significant sex differences in task performance were found. And, for areas where sex predicts poorer performance, it also predicts greater decline in the same domain.

Cognitive reserve is the variable most controllable by the individual. Increased participation in intellectual leisure activities predicted higher cognitive performance in verbal memory and executive functioning. In applying these findings, clinicians should encourage participation in various intellectual pursuits to improve cognitive performance and stave off decline.

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B. CAMINO, D. RIVERA, J. RASERO, L. OLABARRIETA-LANDA & J.M. CORTES. Cognitive age as a Measure of Cognitive Functioning and its Relationship with Cognitive Reserve: Results from a Machine Learning Analysis.

Objective: To introduce the cognitive age (CA) as a new metric for cognitive functioning based on Reitan's Brain-Age Quotient (1973) and assess its relation to cognitive reserve (CR).

Participants and Methods: Sample consisted of 3400 (59.6% Female) healthy adults from 11 Latin American countries (Argentina, Bolivia, Chile, Colombia, Cuba, El Salvador, Guatemala, Mexico, Paraguay, Peru, and Puerto Rico). Average age and education was 54.0±18.8 and 10.5±5.3 years respectively. All participants completed nine neuropsychological tests to assess attention, memory, executive function, and verbal fluency. CA was defined as the age estimation performed by a general linear model with neuropsychological scores used as features and chronological age as the response variable. We first applied feature selection methods to determine what are the three best features that participate the most in the age estimation. 10-fold cross-validation was used to control the bias-variance tradeoff. CR was calculated using year of occupation and years of education by $CR_{Stouffer's\ Z} = (Z_{Education} + Z_{Ocupation})/\sqrt{2}$. Spearman correlation was used to determine the relationship between CA and CR.

Results: We found that Symbol Digit Modalities Test (SDMT), Trail Making Test (TMT) A, and B scores were the features that better estimated age. General linear model was generated using these three features to predict age (Age = 0.149*TMTA + 0.039*TMTB -0.431*SDMT + 53.976). Spearman correlation showed a ρ=-0.817 (p< .001) between CA and CR.

Conclusions: CA, built using the neuropsychological tests TMT-A, TMT-B and SDMT, can assess cognitive maturity in a way that correlates with CR. Future studies should address the relation between CA and CR extrapolates to brain pathologies and neurological disorders.

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T.L. ROBINSON & L.S. MILLER. Frailty and Cognitive Function in Older Adults: A systematic Review and Meta-Analysis of Cross sectional Studies.

Objective: The current analysis was conducted to systematically review the evidence for differences in cognitive performance based on frailty status among older adults, and to provide quantitative evidence for the magnitude of the effect of frailty status on cognitive function. A secondary aim of this analysis was to assess the influence of demographic and methodological variables on this effect.

Participants and Methods: EBSCOhost, Pubmed, and Embase online databases and reference lists were searched to identify cross-sectional studies comparing frail and non-frail/robust older adults (60+) on cognitive performance. Thirty-nine effects were retrieved from 35 studies, expressed as Hedges' g, and pooled based on a random-effects model. Specific moderator variables were tested for their influence on the overall mean effect.

Results: Results indicated a significant overall mean effect of frailty status on cognitive function among tests of global cognitive function (g = 0.740, p <.001, 95% CI = .600-.0881) and among tests of specific cognitive domains (g = 0.426, p <.001, 95% CI = .323-.530).

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Age, frailty assessment used, and cognitive status of the sample did not significantly moderate the overall effect. However, Post-hoc moderator analysis revealed that difference in mean age of frail and robust groups significantly moderated the overall effect ($R2 = 0.40$, $\beta = .0962$, $z = 4.40$, $p < .001$).
Conclusions: These analyses provide quantitative evidence that frail older adults demonstrate significantly lower cognitive performance on tests of global and domain specific cognitive function. This effect is consistent among study samples of variable age, in both cognitively healthy and impaired samples, and across frailty assessment tools. Differences in age between frail and non-frail groups should be taken into account when assessing the relationship between frailty and cognitive outcomes.
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T.L. ROBINSON, M. GOGNIAT, K. JEAN, R.E. SALYER, E. EVANS & L.S. MILLER. BMI and muscle mass are not associated with executive function and working memory in a sample of community dwelling older adults.
Objective: The present study assessed the association between body mass and executive function and how it is influenced by muscle integrity in community dwelling older adults.
Participants and Methods: Fifty-six older adult participants (Mean age = 73.59, SD = 6.23) completed standard tests of executive functioning and working memory, as well as physical evaluation including body composition measurement by Dual-Energy X-Ray Absorptiometry (DEXA). Multiple regression analysis was used to determine if a specific measure of muscle mass independently predicted executive function, and if muscle mass moderated the relationship between BMI and executive performance.
Results: Results revealed that in this sample neither BMI nor regional muscle mass were related to cognitive performance ($F(1, 48) = .580$, $p = .450$, $R^2 = .012$; $F(1,48) = .075$, $p = .785$, $R^2 = .002$). Exploratory analyses revealed modest relationships between visual working memory and body composition measures.
Conclusions: Results may imply weak associations between certain physical health measures and cognitive performance in high-functioning samples.
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L. ROTBLATT, B.P. TAYLOR, A. HORGAS & M. MARSISKE. The Effect of Hypertension, Antihypertensive Treatment, and ApoE4 Genotype on Predicted MCI and Dementia Status in NACC.
Objective: While the negative effects of hypertension on cognitive status have been well documented, the current study aimed to investigate whether severity of hypertension and its pharmacological treatment might affect the odds of cognitive impairment, and whether such hypertension effects might be stronger in persons who were ApoE4 positive due to beta-amyloid deposition and cerebrovascular dysfunction.
Participants and Methods: The current study is a secondary data analysis of baseline data from a subset of the National Alzheimer's Coordinating Center (NACC) database; participants for these analyses were 18,906 cognitively-diverse, participants aged 60-109, 58.4% female. Participants were classified into four groups: untreated normotensive, untreated hypertensive, treated and controlled hypertensive, and treated but uncontrolled hypertensive. In a multinomial regression, the dependent variable was cognitive status (cognitive normal [CN] or demented [DEM]; mild cognitive impairment [MCI] was the reference group). Hypertension effects were adjusted for sex, age, education, and ApoE4 positivity; ApoE4 was also allowed to moderate hypertension effects.
Results: Predicting MCI versus CN status, compared to normotensive individuals, participants with untreated and uncontrolled hypertension had 1.29 and 1.23 times higher odds of having MCI, respectively ($p< .001$). Participants with controlled hypertension had slightly attenuated but elevated odds of having (OR=1.14, $p<.001$). Hypertension status did not predict having MCI versus. DEM. Participants with at least one ApoE4 allele had 1.97 times higher odds of having MCI compared to CN and 2.25 times higher odds of having DEM compared to MCI, but ApoE4 positivity did not moderate hypertension effects.
Conclusions: There was a dose-related association between hypertension and the odds of having MCI, but hypertension did not confer additional risk for DEM versus MCI in this sample. ApoE4 positive participants did not seem to be at greater risk due to hypertension.
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C. SAARELA & M. KARRASCH. The Effect of Using Subjective or Objective Emotional Word Content Ratings on Age Differences in Memory.
Objective: With increasing age, a shift in the preferences for emotion-laden material has been observed. However, it does not emerge consistently. In previous research, age differences in valence-specific preferences in memory were found when subjective, but not objective emotional stimulus content ratings were used to group the stimuli. Here we also studied the role of stimulus-based emotional arousal.
Participants and Methods: We examined whether the generation of age-related effects of valence and arousal on immediate free recall and recognition memory was dependent on word evaluation type in two groups of healthy adults: 21-35-year-old young adults ($n = 25$) and 50-79-year-old older adults ($n = 40$). The words were chosen from a normative database providing emotional content ratings and intentionally encoded in fifteen 10-word lists. After the experiment, the participants rated the target words for valence and arousal. Memory scores were grouped according to subjective or objective ratings in nine valence (positive, negative, neutral) – arousal (low, medium, high) categories.
Results: No age differences were found in the effect of emotion on immediate free recall and hit rate, regardless of whether objective or subjective ratings were used. However, the young adults outperformed the older adults on overall immediate free recall and hit rate. There were distinct effects of valence and arousal on the two memory measures, but only a trend for a modulating impact of evaluation type on the effect of arousal on immediate free recall performance.
Conclusions: The present findings suggest that effects of age or valence on memory do not depend on whether the stimuli are grouped based on objective or subjective emotional content ratings. Still, the results demonstrate the possible relevance of evaluation type when studying cognition-emotion interaction.
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L.E. SALMINEN, A.H. ZHU, B.C. RIEDEL, C.R. CHING, V. KNIGHT, A. SAREMI, F. RASHID, S. THOMOPOLOUS, M.B. HARRISON, A. RAGOTHAMAN, C.P. BOYLE, S.E. MEDLAND, P. THOMPSON & N. JAHANSHAD. Neuroimaging Markers of Perinatal Smoke Exposure Later in Life: An Analysis of the UK Biobank Cohort.
Objective: Perinatal exposure to cigarette smoke has been linked to abnormal cortical development, but it is unclear if brain abnormalities are evident or amplified in older age. Here we used the UK Biobank to examine cortical thickness (CT) and surface area (SA) among individuals aged 50-80 years who self-reported perinatal smoke exposure (PSE). We hypothesized that SA would be preferentially vulnerable to the effects of PSE due to evidence that early exposure to toxins is associated with reduced cortical surface expansion. We also hypothesized that PSE would be associated with greater cortical slopes as a function of increasing age.

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Participants and Methods: We used quantile regressions to examine main effects and interactions of PSE (exposed n=2,663; unexposed n=6,502), and PSE by age, on 34 regions at 9 equidistant points along the distribution of each brain metric. Other covariate predictors included current and past smoking, age, sex, intracranial volume, education, and genetic ancestry.
Results: After applying multiple test corrections, we observed significant but heterogeneous effects of PSE on SA in several regions across quantiles. The most robust and consistent findings were lower SA was in the pericalcarine (PCAL) and inferior parietal (IPL) cortices in the exposed group (adjusted p's <0.001). Negative effects of PSE on CT were primarily observed in the parahippocampal and middle temporal gyri at the 60^{th}-80^{th} quantiles. Age interacted with PSE in the transverse temporal gyrus (p=0.001), such that *unexposed* participants exhibited faster decline in CT with increasing age, despite exhibiting higher CT, on average, in this region.
Conclusions: Cortical metrics were differentially influenced by the effects of PSE in a region-specific manner. Lower SA in the IPL and PCAL agrees with prior work reporting abnormalities in these regions resulting from prenatal nicotine exposure. Temporal lobe and age-dependent effects of PSE on CT may be an important marker of age-related variability in perinatally exposed adults.
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J.L. SAURMAN & B.E. GAVETT. Longitudinal Measurement Invariance of the Auditory Verbal Learning Test in the Alzheimer's Disease Neuroimaging Initiative.
Objective: Longitudinal neuropsychological assessment is valuable for characterizing aging-associated cognitive decline; however, the construct validity of cognitive test score changes has not been thoroughly researched. The current study aims to test the longitudinal measurement invariance (MI) of the Auditory Verbal Learning Test (AVLT) using baseline and 6-month follow-up data from the Alzheimer's Disease Neuroimaging Initiative (ADNI).
Participants and Methods: We analyzed data from 1,187 participants enrolled in ADNI. The sample consisted primarily of male (56.4%) and Caucasian (92.4%) older adults (M_{Age} = 74.55, SD_{Age} = 6.99). 25.7% of participants were diagnosed with dementia; 40.8% with MCI; and 32.9% were considered healthy controls. A confirmatory factor analysis was used to identify a latent variable model for AVLT performance. Next, MI testing proceeded using progressively loosened constraints until acceptable model fit criteria was met.
Results: A two-factor longitudinal model, which included scores from both baseline and 6-month follow-up visits, fit the data adequately (χ^2 (122) = 699.13, CFI = 0.950 RMSEA = 0.083, 90% CI [0.078, 0.089], SRMR = 0.043). Longitudinal MI testing indicated that the AVLT had "strong-plus" MI in the entire sample (RMSEA = 0.070, 95% CI [0.064, 0.075], CFI = 0.960, SRMR = 0.048) and "strong" MI when clinical diagnosis was considered in a multiple groups analysis (RMSEA = 0.059, 95% CI [0.053, 0.066], CFI = 0.958, SRMR = 0.062).
Conclusions: These results suggest that episodic memory as measured by the AVLT is invariant to the time point at which the results were obtained, when considering baseline and 6-month follow-up test results. Thus, these results provide evidence for the construct validity of a latent memory variable derived from AVLT scores, and that changes in this latent variable provide a valid reflection of true episodic memory changes.
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S. SEEHRA, Y. GU, J.J. MANLY, D. SANCHEZ, H. ANDREWS, N. SCHUPF, R. MAYEUX & L.B. ZAHODNE. Percent of Life Spent in the United States and Late-Life Cognition in Caribbean, Central and South American-Born Immigrants.
Objective: This study investigated whether percent of life spent in the United States (PLSinUS) is associated with late-life cognition, and whether it is independent of dietary habits, in older Caribbean, Central and South American-born immigrants living in northern Manhattan.
Participants and Methods: Participants from a longitudinal community-based study completed questionnaires regarding immigration history and dietary habits, as well as clinical and neuropsychological measures, in either English or Spanish. PLSinUS was calculated as ((age at evaluation – age at immigration)/age at evaluation) x 100. Generalized linear models were used to examine cross-sectional associations between PLSinUS and late life cognition, operationalized as domain-specific composite scores, and logistic regression models for the odds of cognitive impairment (i.e., mild cognitive impairment or dementia), adjusted for age, sex, country of origin, education, and reading level. These relationships were then investigated after additional adjustment for consumption of macromolecules, including total fat, saturated fat, polyunsaturated fat, carbohydrates and sucrose.
Results: The subjects on average had 51.46% (SD=19.13%) PLSinUS. One percent increase in PLSinUS was positively associated with language (β=0.100, p<0.001), speed (β=0.209, p<0.001), and visuospatial functioning (β=0.117, p<0.001) scores and negatively associated with odds of cognitive impairment (Odds Ratio= 0.987, 95%CI=0.981-0.993, p<0.001). The relationships between PLSinUS and cognition were largely unchanged, though, when macromolecules were accounted for.
Conclusions: PLSinUS is positively associated with cognition in older Caribbean, Central and South American-born immigrants, independent of dietary habits.
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D.R. SKVARC, O. DEAN, M. BERK, L. GRAY, M. LEWIS, S. DODD, M. FORMICA, T. BROADLEY, E. COSSAR, A. MEEHAN, A. MARRIOTT & L. BYRNE. Depression Increases the Risk of Post Operative Cognitive Dysfunction in Elderly, Major, Non-Cardiac Surgery Patients.
Objective: Post-Operative Cognitive Dysfunction (POCD) is a post-surgical condition common in elderly patients, with significant longitudinal mortality and morbidity concerns. No intervention or preventative agent exists for POCD, and few reliable contributors, aside from ageing and prior cognitive impairment, have been identified. Psychosocial interactions with biological mechanisms have been proposed as a potential exacerbating factor.
Participants and Methods: 250 elderly, major non-cardiac surgery patients (Age M =70.2, SD = 7.1 years; Female n = 144) recruited from a regional hospital in Australia. Medical and demographic histories were obtained prior to surgery, as well as a cognitive assessment using the CogState Brief Battery, MMSE, HADS, and the WHOQOL-BREF. Perioperative medical data were collected and the cognitive test repeated seven days after surgery (POD7). Participants are categorised into POCD or non-POCD based on their day seven scores, adjusted for pre-surgical scores. Hierarchical logistic regression was used to control for known risk factors.
Results: 62 participants were identified as having POCD at POD7. After controlling for age, gender, surgery type, and pre-surgical cognition; a recent (<6 months) diagnosis of depression significantly increased the likelihood of having POCD (OR = 2.73 [1.25, 5.96], p = .012). Age remained a significant predictor (OR = 1.05 [1.01, 1.10], p = .017). However, no other factor including mood disorder severity or psychosocial function were significant at any stage.

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Conclusions: History of depression appears to significantly increase the risk of POCD, regardless of levels of psychosocial distress in the lead up to surgery. Chronic depression may, therefore, moderate the mechanistic pathways of POCD in a way that eludes simple symptoms screening; even if depressive symptoms are controlled, increased risk of POCD remains. Clinicians and medical staff may need to consider that the underlying risk for POCD may be present even if management of the condition is successful.

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C. SUMIDA, A. WEAKLEY, C. DONAHUE, S. FARIAS & M. SCHMITTER-EDGECOMBE. Financial Capacity in a Community Dwelling Sample: Correlations Between Performance-Based Measures and Self-Report Bill Payment Methods.

Objective: Financial management behavior is shifting toward technology-based tools (e.g., online banking, credit cards). However, current clinic assessments do not always match the financial management tools individuals report using in the real-world environment, leading to potential over- or under-estimations of everyday financial management abilities. This study examined relationships between self-reported and performance-based measures of financial management.

Participants and Methods: Sixty-seven community-dwelling older adults (OAs) completed the Repeatable Battery Assessment of Neuropsychological status (RBANS total index score), two performance-based measures with financial capacity subtests [University of California, San Diego Performance Screening Assessment (UPSA), Revised Observable Task of Daily Living (OTDL-R)] and self-report Likert ratings (1=never; 5=always) of financial behaviors (paying bills, paying bills with check, online banking, automatic payment).

Results: Spearman correlations were conducted between the performance-based measures and self-reported financial behaviors. There were no significant results for UPSA performance likely due to ceiling effects. Performance on an OTDLR bill payment task significantly related to reported online banking behaviors. A negative bivariate regression was conducted to further examine this relationship while controlling for cognitive status. Reported online banking behavior and cognitive status both predicted bill payment performance.

Conclusions: Individuals who self-reported engaging in more online banking and checking performed significantly better on an OTDL-R bill paying task while controlling for cognitive status. These results may reflect that OAs who do not transition to online banking may have worse financial capacity. Furthermore, ceiling effects observed on the UPSA tasks but not on the OTDL-R bill payment task suggests that OA financial capacity should be examined using more sensitive measures.

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S. HO, P. SUNDERARAMAN, L. KABIR, Y. STERN & S. COSENTINO. Understanding Financial Decision-Making in Older Adults: Examining Impulsivity, Risk-Taking, and Well-Being.

Objective: Older adults (OAs) are particularly vulnerable to financial exploitation and fraud, rendering financial decision-making (FDM) an important construct to understand. FDM is known to be influenced by impulsivity and risk-aversion in young adults but the extent to which these constructs relate to FDM in OAs is not known. Moreover, the association of FDM with psychological constructs that can change as a result of therapeutic treatment, such as subjective well-being (SWB), has not been examined. The goal of this study was to better understand the various constructs that relate to FDM in OAs.

Participants and Methods: The sample consisted of 46 healthy older adults (63.0% female, 71.7% Caucasian) with an average age of 68.85 years (SD = 5.43) and 15.98 years of education (SD = 2.176) recruited from a larger, ongoing study of cognitive aging. Ryff's 18-item Psychological Well-Being Scale was used to measure SWB; temporal discounting questions were used to measure impulsivity with delays occurring in the short-term (one month) or long-term (one year). Selected items from the Domain-Specific Risk-Taking Scale (DOSPERT) were used to measure financial risk-taking. FDM was measured using the Financial Competence Assessment Inventory (FCAI).

Results: FDM was associated only with education ($r = 0.40$, $p \leq 0.01$) and SWB ($r = 0.31$, $p = 0.04$) in bivariate correlations. A multiple regression model containing SWB and education predicted FDM ($R^2 = 0.19$, *Adj.* $R^2 = 0.15$, $F(529.15, 2226.27) = 5.11$, $p = 0.01$). However, only education had an independent association with FDM ($\beta = 0.33$, $p = 0.03$).

Conclusions: In our cohort of OAs, education seems to be the primary driver of FDM, whereas impulsivity, risk-taking, and SWB seem to play a lesser role. This finding differs from those previously reported, and may reflect this study's specific focus on older adults. Future research will directly address the extent to which correlates of FDM differ across younger and older adults.

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S. SWAMINATHAN, N. LINGUM, A. ALTSCHULER, L. HASHER & K.J. MURPHY. Active Musical Engagement and Cognitive Abilities in Older Adults: A Systematic Review.

Objective: There is growing interest in understanding whether arts engagement benefits cognitive abilities in late life. In this systematic review, we examine the potential of musical engagement for improving cognitive outcomes in older adults.

Participants and Methods: We conducted a systematic review of empirical studies that met the following criteria: (1) they examined current or past involvement in musical activities, (2) the musical activities involved active music making or training in music, (3) the outcome of interest was nonmusical cognition, (4) the studies tested samples of older adults (age: 60+ years), and (5) the studies were published in peer-reviewed journals. We searched Ovid Medline, EMBASE, PsycINFO, and AMED and found 230 articles, of which 30 met our inclusion criteria.

Results: Studies tested auditory/verbal measures of cognition (e.g., auditory stroop, verbal fluency, etc.) more often than nonverbal measures of cognition (e.g., visuospatial span). In studies that measured both auditory/verbal and nonverbal cognition, musical interventions were more likely to be associated with auditory/verbal cognition compared to nonverbal cognition. A history of musical engagement earlier in life predicted current cognitive advantages better than musical interventions received more recently (i.e. in late life). Among studies that investigated musical interventions in late life, those that employed nonstandard musical programs were more likely to report cognitive benefits than those that employed standard music training.

Conclusions: Musical engagement early in life is predictive of better cognition later in life, although causal direction cannot be established in such studies. Individuals who begin to engage in musical activities as older adults may differ motivationally from individuals who start early. They may thus find nonstandard forms of music training more enriching. Musical engagement may be especially beneficial for auditory/verbal cognition in late life.

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J.L. THOMPSON, V.L. MONTGOMERY, K. GOMEZ, A. DIEP, D. MERRILL, S. CHEN, K. LUI, M.J. WRIGHT & E. WOO. Education and Word Reading in Older Adults with Changes in Socioeconomic Status.

Objective: Previous research has shown that socioeconomic status (SES) impacts cognitive functioning. In persons with low SES, word reading ability has been shown to better predict cognitive functioning than years of education. However, there is a dearth of research examining the relationship between changes in SES over the lifespan and early cognitive impairment. The purpose of the current study was to examine the roles of education and word reading ability in executive functioning, specifically organization skills, in older adults of various SES mobility groups (stable SES versus upwardly mobile SES from childhood to older adulthood).

Participants and Methods: Participants included 51 older controls and 50 persons with mild cognitive impairment (MCI). Word reading ability was assessed using the Wechsler Test of Adult Reading. Participants self-reported their childhood and adulthood SES levels as "Wealthy/Well-Off," "Average," or "Somewhat Poor/Poor." Child-to-adult SES mobility was categorized as stable or upwardly mobile (i.e., increasing from one level to a higher level). Organization strategies were assessed using semantic clustering on the California Verbal Learning Test-II.

Results: For individuals with stable SES, years of education and word reading ability did not predict clustering. However, for participants with upwardly mobile SES, education and word reading predicted clustering. When examining SES mobility by diagnosis, education predicted clustering in MCI for those with upwardly mobile SES. In stable SES, education and word reading did not predict clustering in either diagnostic group.

Conclusions: We found that education and word reading ability impacted executive skills in older adults who increased their SES from childhood to older adulthood. This was particularly evident in those with MCI. These findings indicate that SES may not be a static concept, and the ability to change SES levels may be an important factor to consider when evaluating cognitive change.

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V.L. TORRES, M. ROSSELLI, D. LOEWENSTEIN, R. CURIEL, I. VELEZ-URIBE, M. LANG, F. ARRUDA, A. PENATE, D. VAILLANCOURT, M. GREIG-CUSTO, W. BARKER, R. BAUER & R. DUARA. Types of Errors on a Novel Semantic Interference Task in Mild Cognitive Impairment and Alzheimer's Disease.

Objective: To analyze the types of intrusion errors on a verbal task in normally aging participants compared to those with memory complaints, and to correlate these to brain amyloid load.

Participants and Methods: The project is part of the 1Florida Alzheimer's Disease Research Center at the Mount Sinai Medical Center in Miami Beach, FL. We compared types of intrusions on the Loewenstein-Acevedo Scales of Semantic Interference and Learning across 160 individuals (97 females) diagnosed as Cognitively Normal (CN), amnestic Mild Cognitive Impairment (aMCI), and dementia. The sample of 101 Hispanics and 59 non-Hispanic European Americans had a mean age of 72 years (SD=7.76).

Results: Intrusion errors differed across the CN and aMCI groups, and were higher for the aMCI group, $F(2,157) = 11.09$, $p < .001$. The most common types of intrusion errors were words from a competing list under conditions eliciting proactive semantic interference (PSI), failure to recover from proactive semantic interference, and retroactive semantic interference, followed by intrusions representing a semantic category of the test not found on either list. The CN, $F(1,49) = 19.79$, $p < .001$, and aMCI groups, $F(1,80) = 14.57$, $p < .001$ recovered from PSI by decreasing intrusion errors, while the dementia group did not, demonstrating an impaired ability to inhibit errors. The proportion of the type of intrusion errors to total errors differed across the CN and dementia, and aMCI and dementia groups. Competing List intrusions, $F(2,157) = 8.32$, $p < .001$, and Semantically Related intrusions (SRI), $F(2,157) = 9.50$, $p < .001$, differentiated between aMCI and CN. Amyloid load positively correlated to all intrusion errors, particularly to SRI, $r(124) = .40$, $p < .001$. Intrusion errors did not differ by ethnicity.

Conclusions: Intrusion errors and recovery from PSI increased with worsening cognitive performance. The relationship of intrusions errors to increasing amyloid load may relate to deficits in semantic networks associated with AD-related neurodegeneration.

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M. TURCHAN, J.L. THOMPSON, D.B. ELLIOTT, J.E. BOGNER, A.L. JEFFERSON & K. GIFFORD. Clinical and demographic factors influence the discrepancy between self- and informant-subjective cognitive decline.

Objective: Subjective cognitive decline (SCD) is an emerging marker of preclinical dementia. Informant-report of SCD provides additional clinical information, such as the discrepancy between participant and informant ratings. We identify clinical and demographic factors that relate to self- and informant-SCD discrepancies in a cohort of non-demented adults.

Participants and Methods: Non-demented participants (n=522, 69±8 years, 53.1% female) and their loved ones (63±13 years, 68.4% female) from Memory in Adults: A Survey Study completed a comprehensive SCD questionnaire. A SCD-discrepancy score was calculated (participant-informant SCD total score); positive scores reflect self>informant-SCD. Linear regressions related age, education, race/ethnicity, sex, cognitive status (assessed with Telephone Interview for Cognitive Status), depressed mood (assessed with *Center for Epidemiologic Studies Depression* Scale), informant sex, and informant type to the SCD-discrepancy score.

Results: Participant-SCD was greater than informant-SCD (mean discrepancy=16.4±21.6). Increasing age (B=-0.51, p<0.001), male participant sex (B=-3.8, p=0.043), female informant sex (B=4.0, p=0.047), and impaired cognition (B=-13.8; p<0.001) were associated with less SCD-discrepancy; other factors were unrelated (p-values>0.71). In competitive models, age (B=-0.34, p=0.004) and cognitive status (B=-11.1, p<0.001) remained independent predictors of discrepancy. There was no age X cognitive status interaction (p=0.84). Analyses stratified by cognitive status revealed age was associated with SCD-discrepancy in unimpaired (B=-0.38, p=0.001) but not in impaired (B=-0.32, p=0.38) participants.

Conclusions: Participants and informants report discrepant SCD ratings, with participants reporting greater SCD, most notable in younger or cognitively unimpaired individuals. Future research is needed to understand the prognostic value of SCD-discrepancies.

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S.M. TURNER, L. GAYNOR, C. ELLISION, C. DUNN, C. JANUS & R. BAUER. Allocentric Search Strategy Use in a Spatial Navigation Task Reveals Differences in Normal and Abnormal Aging.

Objective: Decline in spatial navigation is among the functionally important deficits seen in mild cognitive impairment (MCI) and Alzheimer's disease (AD). Such decline may coincide with the earliest detectable pathological changes occurring in AD. Here we aimed to determine if there is a relationship between allocentric strategy use and age/diagnostic status and if this metric correlates with measures of global cognitive performance such as the MMSE

Participants and Methods: In this study, 15 young adults, 38 cognitively normal (CN) older adults, and older adults with aMCI (15) and AD (8) completed a virtual Morris Water Maze Task adapted from the preclinical literature. Participants completed 8 trials of the task and were instructed to navigate the arena using a joystick to locate a hidden platform. Raters scored individual trials as reflecting "allocentric" (environment-centered) or "egocentric" (person-centered) strategy use, using an established rubric (Janus 2004)

Results: Younger adults had a greater tendency to use egocentric navigation than did older adults (U = 89.5, p < 0.001). Proportion of allocentric strategy use significantly declined as cognitive impairment

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increased across the diagnostic groups ($F(2, 59) = 4.444$, $p = 0.016$). Across groups, allocentric strategy use during the later trials of the test was strongly related to the navigation composite score, a measure of spatial mapping ($\rho = 0.516$, $p < 0.001$) and led to faster target acquisition across groups ($\rho = -0.491$, $p < 0.001$)

Conclusions: Arena scores did not correlate with MMSE score ($p > 0.05$), suggesting that allocentric strategy use is an independent sensitive measure of spatial navigation ability, with deficits emerging prior to global cognitive impairment in normal aging populations as well as abnormal aging populations. The VMWM task with classification of allocentric search strategy use may be a particularly sensitive cognitive biomarker to the prodromal phases of pathological aging

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M. UNGRADY, A. KELLY, M. GROSSMAN & J. REILLY. Specificity of the Montreal Cognitive Assessment (MoCA) in Minority Cognitive Aging: A Longitudinal Investigation.

Objective: Global cognitive assessments are widely used to detect cognitive impairment and stage its decline. The effectiveness of such scales requires both sensitivity to detect impairment and specificity to reject normal cases. Specificity is problematic in minority cognitive aging, where false positive rates up to 90% are common (Rossetti et al., 2017). It is unclear how predictive an impaired MoCA score is in this demographic. We aim to evaluate the stability of cognitive performance over time among a cohort of minority older adults initially classified as impaired by MoCA norms.

Participants and Methods: Participants included older African American adults (n=32, mean age=58.36, sd=6.34) who reported no history of neurological injury, and all were older than 45. Participants were evaluated at baseline (T1) and 12 months (T2). We assessed the stability of global cognition in the "impaired" group (<26/30 MoCA score), and a group that was "unimpaired." We looked at the relation to gaze patterns by tracking eye movements as participants named BNT stimuli. We analyzed changes in gaze patterns that might suggest cognitive decline. Retention at T2 was 68%.

Results: At T1, 78% of the sample performed within impaired range on the MoCA [M=21.8], with the remainder scoring within normal limits [M=27.4] (p<.0001). At T2, 77% of the sample scored within impaired range. Both the impaired group and the unimpaired group showed stability over one year (p>.05). However, gaze patterns revealed that the initially impaired group showed significantly slower entry time into an area of interest from T1 [M=540.72ms] to T2 [M=778.12ms] (p=.04). No gaze metrics differed in the unimpaired group.

Conclusions: While both the impaired and unimpaired group exhibited relatively stable MoCA scores over one year, the impaired group exhibited slower gaze patterns at T2 compared to T1. These data suggest that gaze metrics might aid in improving the specificity of the MoCA when classifying minority populations as impaired.

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M. DALLA TORRE & E. VAKIL. Eye Movements as a Potential Factor for Facilitating Memory Retrieval in Older Adults.

Objective: Research on episodic memory has established the existence of a reenactment process: spontaneous eye movements occur during recall, to locations associated with retrieved information. Furthermore, interference in the reenactment process, by maintaining gaze fixation, leads to impaired memory. In this study, we tested the hypothesis that difficulties in the reenactment process contribute to the memory difficulties observed in elderly persons.

Participants and Methods: Thirty-eight older and 38 younger adults participated in this study. Participants were presented with pictures (e.g., animals & vehicles). Item recognition and item location were tested under fixed versus free viewing conditions. Eye movements were monitored throughout the test.

Results: It was found that the reenactment process occurs in both younger and older groups. However, only the younger group showed a memory advantage under free versus fixed viewing conditions. The study provides more evidence for the facilitating role of gaze position during memory retrieval in the younger population, and most importantly, it demonstrates that memory performance of older participants does not benefit from oculomotor system reactivation.

Conclusions: It is possible that older adults need longer dwell time than younger adults in the original location of the object, in order to reactivate memory. In future research, dwell time duration should be manipulated in order to test this interpretation.

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A.M. VANDEBUNTE & S. ROGERS. Positive Panic: The Effect of Anxiety on Auditory Attention.

Objective: Current literature tends to highlight a negative association between anxiety and cognition. However, older adults with elevated state anxiety may benefit from higher arousal in ways that stimulate attention. Research shows states of panic are linked with increased amygdala activity and stimulation of the prefrontal cortex, which also mediates simple auditory attention. This study therefore examines the possibility of a positive relationship between state anxiety and basic auditory attention.

Participants and Methods: A total of 95 older adults, with a mean age of 79 ($SD = 9.80$), completed a comprehensive battery of neuropsychological tests. Attention was assessed through WAIS-IV Digit Span, and state anxiety was evaluated through the BAI, with responses divided into Osman's (1997) factors.

Results: Overall state anxiety was not correlated with WAIS-IV Digit Span, but there was a significant positive association between the BAI Panic factor and Digit Span, $p < .05$, even when age was controlled via hierarchical regression analyses, $p < .04$. Individual bivariate correlations revealed a significant positive correlation between Digit Span and item 7 on the Panic factor, $p < .01$, even controlling for age, $p < .01$. Semipartial correlations controlling for age showed a significant relationship between the number of digits recalled forward and the panic symptoms of anxiety, $p < .03$, particularly those who endorsed greater heart racing, $p < .01$.

Conclusions: Contrary to the perception that anxiety is predominantly deleterious to older adults, auditory attention appears to be positively correlated with the panic symptoms of anxiety. The particular panic symptom that seems most related is the sensation of one's heart racing. Moreover, panic symptoms seem positively correlated only with basic auditory attention, rather than working memory. These findings suggest that certain physiological sensations may be a tool in heightening auditory attention. Additionally, losses in attention should be monitored when anxiety is treated.

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J.B. WADE, R. HAYES, J.H. WADE, J. BEKENSTEIN, K. WILLIAMS & J. BAJAJ. Successful Aging: The Relationship Between Spirituality and Happiness in Neurological Disorders.

Objective: Given a rapidly aging population we focused on determinants of successful aging in adults with neurological illness. The authors examined whether the Spiritual Well-Being Scale (SWBS) would be associated with 2 markers of health status: the Pemberton Happiness Index (PHI) and sleep quality (i.e., number of nighttime awakenings).

Participants and Methods: Three hundred and fifty four outpatients suffering from various neurological disorders referred for neuropsychological assessment were studied. Multivariate regression was used to explore the relationship between study variables after accounting

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for severity of cognitive decline associated with the neurologic illness, physical activity level, depression severity, and demographic variables (i.e., subject age, sex, ethnicity, and marital status).
Results: A unique association was found between SWBS and both the PHI Remembered Happiness scale (PHI R) (p<.001), and PHI Experienced Happiness scale (PHI E) (P<.001). The SWBS uniquely accounted for 19% in PHI R, and 10% of the variance in PHI E. When both SWBS Religious Scale (RS) and SWBS Existential Scale (ES) were separately entered into a subsequent regression model only SWBS ES, and not the SWBS RS, was uniquely associated with PHI R (p<.001) and PHI E (p<.001), uniquely accounting for 35%, and 14% of the variance, respectively. A separate multivariate regression analysis revealed that SWBS was associated with number of nighttime awakenings (p<.002). When both SWBS RS and SWBS ES were separately entered into a subsequent regression model only SWBS ES predicted number of nighttime awakenings (p<.001), uniquely accounting for 3% of the variance.
Conclusions: Spiritual well-being was independently associated with 2 markers of health status (i.e., happiness and sleep hygiene). Importantly, the existential spiritual dimension (SWBS ES), rather than religious beliefs (SWBS RS), served as a protective factor against adversity in coping with neurological illness.
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S.M. WALTERS, J. BROWN, M. YOU, D. COTTER, M. ALTENDAHL, A. WOLF, Y. COBIGO, A.C. APPLE, K.B. CASALETTO, J. KRAMER & A.M. STAFFARONI. Longitudinal Decline in Global Efficiency of the Brain's Functional Connectome is Specifically Associated with Declining Processing Speed in Functionally Normal Older Adults.
Objective: Efficient communication across brain regions is vital for cognitive performance, especially processing speed (PS). Global efficiency (GE) is a graph metric derived from task-free fMRI (tf-fMRI) that quantifies the brain's functional integration. We built on cross-sectional studies that show age-based GE decline by examining longitudinal relationships between GE and PS in older adults, and investigated the role of decreased vascular and white matter integrity as modulators of this relationship.
Participants and Methods: 235 functionally normal older adults (age M=72; 53% female; education M=17.3; CDR=0) followed longitudinally (1–4 visits; M=1.6) completed a PS battery and underwent an MRI scan (3-Tesla). White matter microstructure was quantified using whole brain fractional anisotropy (FA) from DTI. Memory and executive function tasks were administered and summarized as composite Z-scores and summary NACC Health History vascular risk scores were calculated. The association between whole-brain GE and PS was analyzed using a linear random mixed effects model, controlling for age, gender, education, grey matter volume and total intracranial volume.
Results: Longitudinal declines in GE were associated with greater slowing in PS as individuals aged (b=-.16, p=.01). This relationship remained (p=.01) after covarying for vascular risk and FA. In contrast, within-person changes in GE were not associated with memory or executive function (ps>.35).
Conclusions: Global efficiency decreases in cognitively normal older adults were associated longitudinally with cognitive slowing. This relationship remained significant even after controlling for vascular risk factors and white matter microstructure. Moreover, GE is distinctly related to processing speed, but not other cognitive domains affected by aging such as memory and executive function. This suggests that GE is a robust, independent biomarker of cognitive slowing in otherwise functionally and cognitively intact older adults.
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S. WEISENBACH, V. KOPPELMANS, J. KIM, A. ARP, N. HOVATTA, V. PATRON, N. GRUBMAN, J. GERMAIN, R. WELSH, J. ZUBIETA & S.A. LANGENECKER. Resting State Brain Network Connectivity Predicts Cognition in Healthy Older Adults.
Objective: There is growing interest in coherence of functional brain networks during the resting state (RS). While evidence suggests that network coherence predicts cognitive performance in psychiatric and neurologic diseases, less is known about how within-network coherence predicts cognition in healthy aging. This study sought to elucidate relationships between Default Mode Network (DMN) and Cognitive Control Network (CCN) RS network coherence and performance on a comprehensive battery of neuropsychological tests.
Participants and Methods: 31 never-depressed, cognitively normal older adults (M age = 70, SD = 6) completed a neuropsychological test battery and an 8-minute resting state fMRI scan. Independent component analysis was used to segregate DMN and right and left CCN using the GIFT Toolbox. A series of multiple regression analyses were conducted with DMN, left, or right CCN as the predictor variable, covarying for age, scanner, and cross correlation values with the template brain. Age-corrected neuropsychological test scores composed outcome variables.
Results: Left CCN coherence positively predicted performance on measures of concept formation and verbal fluency (Adj. R^2s = .22 - .45, all ps < .05). DMN connectivity positively predicted performance in a variety of cognitive domains, including memory retrieval, working memory, and executive functioning (Adj. R^2s = .22-.41, all ps < .05).
Conclusions: In healthy older adults, coherence of regions within left CCN positively predicts performance specifically on higher-order executive functioning measures. DMN network coherence predicts performance in a wider variety of cognitive domains. Extent of coherence during RS in specific brain networks may be predictive of future cognitive decline. Ongoing data collection follows this sample longitudinally, with annual cognitive assessments.
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G. WEISSBERGER, D. HAN, L. YU, L.L. BARNES, D. BENNETT & P. BOYLE. Financial and Health Literacy Discrepancies with Cognition in Older adults.
Objective: Greater financial and health literacy are associated with better cognition and lower mortality in older adults. Although literacy and cognition are linked, research suggests that some individuals exhibit differences, or discrepancies, in these abilities in old age. We investigated discrepancies between literacy and cognition and factors associated with such discrepancies in a large group of older adults without dementia.
Participants and Methods: Older adults without dementia (N=714, age: M=81.4; education: M=15.4; 75.4% female; 5.2% non-white) from the Rush Memory and Aging Project completed a detailed cognitive battery and a measure of financial and health literacy that yielded a total literacy score. Participants were characterized into three groups using a previously-established discrepancy approach: 1) total literacy scores that are more than one standard deviation (SD) above cognitive scores (L>C); 2) total literacy scores falling more than 1SD below cognitive scores (L<C); and 3) total literacy within 1SD of cognition (L=C). Logistic regression analyses were employed to investigate associations between demographic and psychosocial variables and discrepancy group status.
Results: Of the 714 participants, 24% showed a significant discrepancy. In fully adjusted models, in reference to the L=C group, male sex was associated with greater odds of being in the L>C group (OR=2.32, 95% CI 1.33-4.03, p=0.003) and lower odds of being in the L<C group (OR=0.31, 95% CI 0.14-0.66, p=0.002), higher income was associated with lower odds of being in either discrepancy group (L<C OR=0.87, 95% CI 0.79-0.96, p=0.004; L>C OR=0.86, 95% CI 0.76-0.96, p=0.007), and higher trust was associated with lower odds of being in the L>C group (OR=0.92, 95% CI 0.85-0.99, p=0.03).
Conclusions: Findings support literacy and cognition as partially dissociable constructs in a considerable portion of older adults and highlight

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important demographic and psychosocial factors that are associated with discrepancies.

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G. WEISSBERGER, L. MOSQUEDA, A. NGUYEN, A. SAMEK, P. BOYLE, C. NGUYEN, E. PARUNAKIAN & D. HAN. Functional Connectivity of the Insula in Financially Exploited Older Adults: Preliminary Findings from the Finance, Cognition, and Health in Elders Study (FINCHES).

Objective: The neural correlates of financial exploitation (FE) in old age are poorly understood. The insula is involved in perceptions of trust. Thus, functional connectivity (FC) of the insula may be impacted by FE. This study investigated whole-brain FC of the insula in older adults with or without history of FE.

Participants and Methods: Older adults who self-reported a history of FE (N=15; M age=70.3, SD=9.1) and non-FE adults (N=16; M age=72.9, SD=9.9) underwent r-sfMRI. The left and right insula were regions of interest prescribed based on the Harvard-Oxford atlas. Functional realignment and unwarping, slice-timing correction, structural segmentation and normalization, functional normalization, outlier detection, smoothing, and denoising were applied to scans. FC differences between groups were considered significant at an FDR-corrected two-sided cluster level of p<0.05, and voxel level threshold of p<0.005. Age, education, sex, and MoCA scores were included as covariates.

Results: Groups did not differ on age, education, sex, race, or MoCA score. All adults were considered cognitively intact. FE adults showed greater FC between the right insula and three clusters: a left fusiform/parahippocampal region (t(29)=5.33), a right fusiform region (t(29)=4.94), and the brainstem (t(29)=6.06). FE older adults had greater FC between the left insula and two clusters, a right temporal region (t(29)=6.03) and a left fusiform/parahippocampal region (t(29)=5.32), and less FC between the left insula and two clusters, a right lateral occipital region (t(29)=-4.93) and the left cerebellum (t(29)=-4.64).

Conclusions: Results suggest FE in old age is associated with whole-brain FC differences involving the insula among cognitively intact older adults. In particular, FC differences between the insula and the temporal lobe may implicate brain functional and network changes that occur as a consequence of FE, potentially due to changes in one's perception of trust following FE.

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K.D. WESBECHER, D. CRUZ, A. DUNN & L. PALMER. Meaning in Life and Positive Neuropsychological Processes in Older Adults: Cognitive Control, Positive Reappraisal and Perceived Stress.

Objective: Although meaning in life has been associated with positive outcomes in the broader mental health literature, less is known about meaning in life as it relates to factors important to successful aging, such as perceived stress. Previous research shows that meaning in life is associated with lower levels of perceived stress. Research also demonstrates that emotional regulation and cognitive control are two factors underlying this relationship. However, these factors embark on a paradoxical path as we age, such that older adults experience increases in emotional regulation despite declines in cognitive control. This study investigated the relationship between meaning in life and perceived stress, while taking into consideration older adults' available cognitive resources and use positive reappraisal, a form of emotional regulation. We hypothesized that increased meaning in life would predict lower levels of perceived stress, and that this relationship would be mediated by enhanced cognitive control and positive reappraisal in a sample of older adults.

Participants and Methods: To investigate processes within a proposed theoretical framework, a sample of older adults (N=50) with a mean age of 84 were recruited from the community. The battery included self-report measures for meaning in life, positive reappraisal and perceived stress as well as a number of neuropsychological measures assessing working memory, set-shifting and cognitive inhibition.

Results: Analyses were conducted using the macro called PROCESS (Hayes, 2013). As predicted, the direct effect of meaning in life on perceived stress was significant; however, only positive reappraisal emerged as a significant mediator of this relationship.

Conclusions: Overall, findings highlight the role of enhanced emotional regulation abilities as a potential benefit both associated with and responsible for the relationship between meaning in life and perceived stress. Study limitations, clinical implications and future directions will be discussed.

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C.B. WOOLVERTON & E. GLISKY. Cognitive and Social Benefits Following Brief Social Intergenerational Interactions Among Older Adults.

Objective: Interventions designed to engage older adults in social interactions have demonstrated benefits in performance on cognitive tasks and psychosocial factors. Although these interventions are promising, they tend to be time-consuming. The current study aimed to evaluate the effect of a brief four-visit social interaction between older adults and undergraduate students on older adults' cognition, social and psychological well-being.

Participants and Methods: Older adults (ages 65-92) living in assisted living (n=15), independent community living (n=7), or in-own-home dwelling (n=4) participated in a brief intergenerational social interaction. Undergraduate students (aged 18-22) met with older adults from each of the locations with the task of collecting their life stories and creating a book for the older adults. Older adults completed tests of memory, speed of processing, and executive functions. Psychological well-being and social factors were assessed using self-report measures.

Results: Results indicated a marginal benefit in speed of processing, t (22) = 1.88, p=.07, d=.40 following the brief intervention. Measures of memory and executive functions did not reveal significant changes. With regard to social factors, older adults' perceptions of aging became more positive, specifically on a sub-scale that measures emotional responses to thinking about getting older, t (20) =2.19, p=.041, d= .60. A secondary analysis suggested that SES might be relevant, with a trend towards a greater decrease in negative emotional responses towards aging among older adults from low SES backgrounds.

Conclusions: These results demonstrate that a brief social interaction between young and older adults may provide some benefits for cognition, and a significant decrease in older adults' negative emotional responses towards aging. SES also appears to be an important factor to consider.

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Y. XIA, C. ARAUJO, N. DEFORD, V. MERRITT & A. JAK. Differential Utility of Self- and Informant-Rated Cognitive Complaints in Non-Demented Older Adults.

Objective: Subjective self- and informant-based cognitive complaints have variable utility in identifying mild cognitive impairment (MCI). Importantly, mood and degree of cognitive impairment are notable factors contributing to this variability. Therefore, we sought to further explore relationships between subjective cognitive complaints, informant-reported complaints, and objective cognitive performance in non-demented older adults.

Participants and Methods: 52 non-demented adults, ages 55-80 (M=69.00, SD=6.37), completed neuropsychological assessment, including self-report questionnaires, as part of a cognitive intervention

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study. Participants had a minimum score of 18 (M=25.62, SD=2.94) on the Montreal Cognitive Assessment (MoCA) and 0 or 0.5 on the Clinical Dementia Rating. We used the Everyday Cognition Scale (Ecog) to assess self-rated (S-Ecog) and informant-rated (I-Ecog) subjective complaints, and the Geriatric Depression Scale (GDS) to assess current mood.
Results: Participants were split into cognitively normal (MoCA >26) and mildly-impaired (MoCA <26) groups. Multiple regression analyses revealed that objective cognitive test performance predicted I-Ecog scores (but not S-Ecog) in the impaired group (p.=.002-.036)but not in the normal group (p.=.251-.980). Scores on the GDS predicted S-Ecog scores in the normal (p.=.003-.008) but not the impaired group (p.=.148-.236).
Conclusions: Subjective cognitive complaints did not consistently map onto objective tests of cognition but were associated with mood disturbances in non-cognitively impaired individuals. Conversely, informant-rated cognitive complaints were associated with objective cognitive performance but only in cognitively impaired individuals. Our study suggests that self and informant reports of cognitive changes may have differential utility depending on the degree of global cognitive functioning.
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N. YAZDANI, J. MINAHAN, F. FALZARANO & K.L. SIEDLECKI. Examining Processing Speed as a Predictor of Subjective Well-Being across Age and Time in the German Aging Survey.
Objective: High levels of subjective well-being have been considered a hallmark of successful aging. Several factors have been associated with aspects of subjective well-being, including neurocognitive functioning, and, in particular, processing speed. The purpose of the study was to 1) examine whether speed predicts different aspects of subjective well-being across age cross-sectionally, 2) examine whether age moderates the relationship between speed and subjective well-being, and 3) use cross-lagged panel analysis to examine the longitudinal relationships between speed and subjective well-being.
Participants and Methods: Measures of processing speed (operationalized via the Digit Symbol Substitution Task) and subjective well-being (measured using the Satisfaction with Life Scale and the Positive and Negative Affect scale) were obtained from participants between the ages of 40-85 years (at baseline) who participated in the German Aging Survey across four waves.
Results: In cross-sectional analyses, the well-being constructs of life satisfaction, positive affect, and negative affect were represented by latent factors in a structural equation model with digit symbol as a predictor (age, gender, and self-rated health were included as covariates). Digit symbol was a weak, but consistent predictor of positive affect across all four waves of data (standardized loadings ranged from .10 to.18). Age was consistently negatively associated with negative affect and positively associated with life satisfaction, and did not moderate the relationship between speed and well-being. Longitudinal cross-lagged panel analyses showed that the temporal relationship between processing speed and positive affect was close to zero, and non-significant.
Conclusions: In a large community-based representative sample of German middle-aged and older adults, there is a weak but consistent relationship between processing speed and positive affect in cross-sectional samples, but not longitudinally.
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G. YING, J. VONK, K. SOL, J.J. MANLY & L.B. ZAHODNE. The Influence of Family Social Ties and Emotional Support on the Trajectory of Cognitive Decline in a Multi-Ethnic Cohort.
Objective: Lack of social support has been linked to lower cognition among older adults, but results may vary across race and ethnicity. To investigate whether social ties are also associated with change in cognition over time and if differences are notable across race and ethnicity, we investigated the effects of family ties and emotional support on cognitive trajectory in Whites, Blacks, and Hispanics.
Participants and Methods: Using multiple group latent growth curve models in 1741 initially non-demented older adults (age m = 76.6, SD = 6.2), we analyzed composite scores of language, memory, and visuospatial ability at 18-24 month intervals for up to six visits. Intercepts and slopes were regressed onto a factor score of family ties and a composite score of emotional support (feeling lonely/having no one to talk to about problems), controlling for age, education, gender, marital status, depressive symptoms, income, and occupation.
Results: For Hispanics, but not Blacks or Whites, having more family ties was associated with slower rates of memory (b = 0.052, p = .001) and language (b = 0.023, p = .033) decline, but not visuospatial decline (b = 0.011, p = .351). Family ties were not associated with baseline performance in any group. General linear models showed that Hispanics had more living children, grandchildren, and siblings (all p < .001) than Whites and Blacks. Emotional support was not associated with cognitive level or decline in any group.
Conclusions: More active family ties predict slower cognitive decline in Hispanics, who on average have more family connections than Whites and Blacks. Thus, more family ties may be beneficial in cognitive aging when the social network is of substantial magnitude. A mechanism through which a large family network may promote slower decline could be active communication, which stimulates memory and language, but not visuospatial abilities.
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A.B. ZAHEED, J.J. MANLY, N. SCHUPF, R. MAYEUX, A.M. BRICKMAN & L.B. ZAHODNE. Perceived Control may Buffer the Indirect Effect of Stress on Memory in Older Adults.
Objective: Chronic stress is a risk factor for negative health outcomes, including cognitive impairment in later life. The negative association between stress and cognition may be mediated by depressive symptoms, which separate studies have identified as both a consequence of chronic stress and a risk factor for cognitive decline. Pathways linking chronic stress, depressive symptoms, and cognition may also be moderated by sociodemographic characteristics and modifiable psychosocial resources. The goal of this cross-sectional study was to enhance understanding of the mechanisms and modifiability of the stress-cognition link in a racially and ethnically diverse sample of older adults.
Participants and Methods: A linear regression estimated the association between perceived stress and a memory composite score in 578 older adults (mean age= 75) in the Washington Heights-Inwood Columbia Aging Project. Subsequent models tested whether depressive symptoms mediated the stress-memory relationship and whether sociodemographics (gender, race and ethnicity) or psychosocial factors (social support, perceived control) moderated these pathways.
Results: Independent of sociodemographics and chronic diseases, greater perceived stress was associated with worse episodic memory. This relationship was mediated by depressive symptoms, such that greater stress was associated with more depressive symptoms, which was associated with worse memory. This indirect effect was attenuated by perceived control, which buffered the association between stress and depressive symptoms. There was no significant moderation by sociodemographics or social support.
Conclusions: While cross-sectional, these results suggest that depressive symptoms may play a role in the negative association between stress and cognition among older adults. Perceived control is a modifiable psychological resource that may attenuate the negative impact of chronic stress, but longitudinal and intervention work is needed.
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Z.Z. ZLATAR, Z. MESTRE, C.C. HAYS, M. MELOY, J. OSUNA & C. WIERENGA. Passive Rather than Active Sedentary Behaviors are Associated with Worse Executive Functions in Older Adults.
Objective: Sedentary behavior (SB), characterized by low energy expenditure (i.e., sitting, lying down), is very common amongst older adults and has emerged as an independent predictor of negative health outcomes. Studies suggest that not all SB may equally affect cognition (higher TV watching time = worse executive functions; higher computer use = better verbal memory). Since targeted interventions to reduce SB should maximize cognitive benefits, more research is needed to distinguish how active versus passive SB (i.e., sitting while socializing/hobbies vs. watching TV/napping) may differentially affect cognition. This study examined how active and passive SB relates to memory and executive functions in older adults to detect which SBs may be detrimental to cognition and which may bolster it.
Participants and Methods: Sixty-two cognitively healthy older adults, ages 65-85, completed a SB questionnaire and neuropsychological testing. Executive (Trail Making Test parts A and B; phonemic fluency) and memory composite scores (immediate and delayed story recall and a famous face recognition task) were created by averaging z-scores based on the entire group. Partial correlations adjusted for age, sex, and years of education, explored associations between self-reported daily hours spent in active/passive SB and executive/memory composite scores.
Results: Time spent in active SB (computer, reading, socializing, hobbies, driving) was not associated with memory or executive function scores. On the other hand, more hours spent in passive SB (watching TV, eating, napping) was significantly associated with worse performance on the executive functions composite (r= -.44, p<.001).
Conclusions: Findings indicate that passive SB may be more detrimental for cognitive health than active (i.e, more engaged) SB. More research is needed to better understand the effects of different SB patterns on cognition and brain health for targeted intervention development.
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Dementia (Non-AD)

M. AZAR, Y. GU, Y. STERN, S. LAWLESS & S. COSENTINO. Differences in the clinical presentation of autopsy-confirmed Alzheimer's disease (AD) versus AD plus Lewy Body Disease (LBD).
Objective: The experience of living with Alzheimer's disease (AD) versus AD with Lewy Body disease (LBD) has not been extensively explored. The current study examined the difference in dependence between autopsy confirmed AD versus AD+LBD. Results have the potential to impact knowledge regarding caregiver burden, and to help gear services targeted at the most burdensome difficulties for each diagnosis.
Participants and Methods: 53 participants who underwent autopsy and received pathological diagnoses of AD or AD plus LBD were drawn from the Predictors Study. Chi-square tests and a one-way ANOVA determined differences in overall dependence level and cognitive deficits reported by informants on the Communication Abilities (CA) scale, between individuals with autopsy-confirmed diagnosis of pure AD (n=31) vs AD with LBD (n=22).
Results: The two groups did not differ in age, education, gender, or cognitive status. Individuals with AD plus LBD had more navigation difficulties, x^2 (2, N = 53) = 16.19, p<0.01 and greater dependence on caregivers, $F(1,48)$ =10.78, p < .01 than those with autopsy-confirmed pure AD. However, there were no significant differences in remembering items on a list (p=0.46) or recent events (p=0.47), understanding others' speaking (p=0.39), or being understood by others (p=0.15)
Conclusions: Despite previous research indicating differences in language and memory between LBD and AD, there were no differences in reports of these symptoms per informants. Instead, reports of spatial orientation (i.e., navigation) and overall dependence differed across these diagnoses. Future research should further explore patient and caregiver burden in relation to these differential diagnoses, and explore additional sources of collateral report (i.e., clinician, patient, objective performance) to better understand mechanisms driving the differences in dependence and possibly burden, shedding light on future intervention.
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MCI (Mild Cognitive Impairment)

T.P. BULL, K. STEWARD, R. KENNEDY, M. CROWE, A. KNIGHT, J. ELGIN, C. OWSLEY & V. WADLEY. Predicting On-Road Driving Performance with the TMT and UFOV in Older Adults on a Continuum of MCI.
Objective: Previous studies have indicated that the Trails Making Test A and B (TMT-A & B) and the Useful Field of View (UFOV) are predicative of on-road driving performance. This study will examine the Receiver Operating Curve (ROC) and subsequent cutoff scores of the TMT- A & B and the UFOV divided attention subtest (UFOV-2) within a population representing a continuum of Mild Cognitive Impairment (MCI).
Participants and Methods: Ninety-eight clinically referred adults aged 54-88 were evaluated through a comprehensive neuropsychological battery, informant questionnaire, and medical history, and classified by investigators as either possible MCI (no objective impairment), MCI-non amnestic, MCI-amnestic single domain, MCI-amnestic multiple domain, or mild dementia. The TMT-A & B and the UFOV were administered within the battery and an on-road driving test was administered separately by a Certified Driving Rehabilitation Specialist and a back-seat rater who were masked to diagnoses and cognitive performance. The backseat rater and the CDRS completed global driving ratings of each participant on a 1-5 scale with a 5 indicating optimal performance. Both raters' scores were averaged and then dichotomized (satisfactory or unsatisfactory) and individual ROCs were analyzed for the TMT-A, TMT-B, and UFOV-2.
Results: The ROC analyses demonstrated an area under the curve (AUC) above the acceptable range of .70 for the TMT-A, TMT-B and UFOV-2. Maximizing sensitivity and specificity indicated a cutoff score of 49 seconds for the TMT-A, 185 seconds for the TMT-B, and 275 msecs for the UFOV-2. Sensitivity was .71 for the TMT-A, .68 for TMT-B, and .71 for the UFOV-2, while specificity was .71 for TMT-A, .80 for TMT-B, and .70 for the UFOV-2.
Conclusions: The findings are consistent with previous studies and indicate that the TMT-A & B and the UFOV-2 are predictive of on road driving performance. The present study provides additional support of the measures within an MCI continuum and suggest preliminary cutoff scores for the MCI population.
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Other

V. SANBORN, M. AZCARATE-PERIL, J. UPDEGRAFF, L.M. MANDERINO & J. GUNSTAD. Poorer Attention is Associated with Reduced Adherence in a Clinical Trial.
Objective: Cognitive dysfunction is associated with reduced medication adherence in clinical settings. Less is known about the impact of cognitive dysfunction on adherence to supplements taken during clinical trials with non-neurological samples, potentially distorting the outcomes of these studies. The current study examined the relationship between baseline cognitive function and adherence in a study of the potential cognitive benefits of a nutritional supplement.
Participants and Methods: A total of 126 middle-aged and older adults (M_{age}= 64.3, 59% female) were included in the current analyses. Of the sample, 10 did not meet study compliance requirements

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(i.e. <80% capsules taken, missing study visits). Parent study exclusion criteria included current/history of neurological disorder, severe psychiatric disorder (e.g. schizophrenia, bipolar), severe gastrointestinal symptoms or surgery, substance abuse, and specific medications/supplements. Cognitive function was assessed using NIH Toolbox and adherence over a 90-day period through pill count at study visits.
Results: T-tests showed participants with poor adherence performed worse on the Flanker (t_{124}=-2.81, p=.01), List Sorting (t_{124}=-3.11, p<.01), and total cognition indices (t_{124}=-2.17, p=.02). When limiting analyses to only those participants with sufficient adherence, separate linear regressions showed that better performance on Flanker (R^2=.03, F(1,114)=3.88, p=.05) was significantly predictive of better medication compliance. Picture Sequence, Card Sort, List Sorting, Pattern Comparison, and total cognition scores were not predictive of medication compliance (all p>.05).
Conclusions: Consistent with patient samples, poorer cognitive function was associated with reduced adherence to study protocol in a sample of neurologically-intact middle-aged and older adults. If replicated in other samples, this finding has important implications for studies involving nutraceutical products.
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V. TRAN, G. VITALE, N. BOSTON, R.D. BENNETT, M. LENOX, J. GARCIA, D. RADMANESH, M. BOIX BRAGA & A. ACEVEDO. Neuropsychological and MRI Findings in a Sample of Older Adults with Hyperlipidemia.
Objective: To examine cognition, daily functioning, and structural imaging results of older adults with hyperlipidemia (HLD).
Participants and Methods: Data analyzed was derived from a de-identified database of older adults (age>=65) from the National Alzheimer's Coordinating Center (NACC). The sample (N=705; 61.6% female; 88.8% Caucasian; M_{age}=74.58 years; SD_{age}=11.91 years; M_{Ed}=15.46 years; SD_{Ed}=5.63 years) was sorted into two groups: 1) HLD [N=458] and 2) without HLD [N=247]. All subjects completed a neuropsychological battery, Cognitive Dementia Rating Scale, and MRI. A MANCOVA was conducted, using gender and race as covariates, to compare the groups' cognitive performance, functional ability, and structural neuroimaging.
Results: A MANCOVA revealed a significant overall effect for the model at α=.05, Wilks' λ=.924, F(18, 684)=3.147, p<.001. Tests of between-subjects using a Bonferroni adjustment found that those with HLD, when gender was controlled for, exhibited worse verbal memory, simple attention, working memory, executive functioning, confrontational naming, and everyday functions. The HLD group also exhibited reduced total brain volume, gray matter, and white matter volume.
Conclusions: Cognitive decline is a significant concern among older adults. As the demographic is reported to be three times more likely to have HLD, we explored the possibility of an existing relationship. Results evidenced a significant relationship between HLD and negative neurocognitive and neurological effects. It seems possible that with increased cholesterol comes both reduced brain volume and function. HLD is associated with atherosclerosis, which can result in reduced cerebral blood flow and the development of brain lesions. Therefore, combating levels of fat stores within blood vessels may prove to be an effective prevention against significant cognitive decline in older adults. Further in-depth analysis is required to further discern the role of HLD on the brain.
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Program Welcome

Program Committee Chair: Michael Kirkwood

4:15–4:30 p.m.

Plenary A. (INS Presidential Address) Concussion Outcomes in Children: Facts, Fictions, and the Future

Presenter: Keith Yeates

4:30–5:30 p.m.

K. YEATES. Concussion Outcomes in Children: Facts, Fictions, and the Future.
More than half a million US children visit an emergency department each year for traumatic brain injury (TBI), mostly for mild injuries, and the true number of concussions in children and youth likely numbers much higher, in the millions. Despite an exponential increase in research in recent years, distinguishing fact from fiction regarding the outcomes of childhood concussion can be very challenging. Neuropsychologists are by no means immune to this problem, as evidenced by the strident claims and counterclaims made on disciplinary list serves, in scientific journals, and at professional meetings. The goal of this presentation is to differentiate fact from fiction based on research conducted by the presenter and his colleagues over the past 25 years. Topics to be addressed include the role of performance and symptom validity testing, the utility of neuropsychological testing, the relative importance of injury and non-injury factors as predictors of recovery, and the capacity of prevention and treatment to reduce the incidence and morbidity of concussion. The presentation should help to dispel some ongoing misconceptions about the outcomes of childhood concussion; encourage a more evenhanded, evidence-based approach to parsing the complexity of this common injury; and suggest directions for future research that may help bring order out of the chaos that so often surrounds this topic.
Learning objectives:
Based on the content of the presentation, the learner will be able to:
1) Describe common misconceptions about the outcomes of childhood concussion.
2) Summarize recent research on the outcomes of childhood concussion and its predictors.
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INS Awards Ceremony

Awards Committee Chair: Roy P. Kessels

5:30–6:30 p.m.

Welcome Reception Sponsored by Faculty of Arts at U of Calgary

6:30–7:30 p.m.

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THURSDAY MORNING, FEBRUARY 21, 2019

CE Workshop 7. Cognitive Recovery: The Power of Treatment in the Opioid Crisis

Presenter: Monica G. Rivera Mindt

7:20–8:50 a.m.

M.G. RIVERA MINDT, T.M. SCOTT, P. OLSEN, F. ARIAS & J. ARNSTEN. Cognitive Recovery: The Power of Treatment in the Opioid Crisis.

Worldwide, opioid misuse and opioid use disorder (OUD) are at epidemic levels. In the U.S., over two million Americans suffer from OUDs (Center for Behavioral Health Statistics & Quality, 2016) resulting in profound public health consequences, including a 200% increase in the rate of opioid-related overdose deaths from 2000-2014 (Centers for Disease Control [CDC], 2016) and increased spread of HIV and hepatitis C (CDC, 2015) from opioid-related injection drug use. In response, the U.S. Department of Health & Human Services recently declared the opioid crisis a public health emergency and developed a 5-Point strategy to combat the crisis. However, the current strategy lacks attention to the role of cognitive health in the course of opioid addiction and treatment. Given that research suggests that opioid use can have deleterious short- and long-term effects on brain and cognitive function, cognitive health is an important factor for consideration in OUD treatment. This presentation will provide an overview of the history and current status of the opioid crisis. Next, it will examine the effects of opioid use on brain and cognitive function and highlight cutting-edge research on the impact of two commonly used opiate agonist treatment (OAT) medications on cognitive function. These two medications, methadone and buprenorphine, possess significantly different neural mechanisms that may have important implications for cognitive health. Finally, this presentation will consider the potential public health impact of cognitive recovery related to treatment of OUD with OAT. As a result of course participation, attendees will achieve the following objectives: 1) Demonstrate knowledge of the history & current status of the opioid crisis; 2) List the ways opioid use affects brain & cognitive function; and 3) Discuss the impact of two commonly used opiate agonist treatments (methadone & buprenorphine) on cognitive function.

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CE Workshop 8. Autism Spectrum Disorders Across The Adult Lifespan. What do we know and what do we need to know?

Presenter: Rebecca A. Charlton

7:20–8:50 a.m.

R.A. CHARLTON. Autism Spectrum Disorders Across The Adult Lifespan. What do we know and what do we need to know?

Most of our knowledge about Autism Spectrum Disorders (ASD) comes from childhood, despite the fact that most people with ASD are adults. This course will review the existing research on adulthood in ASD with a particular focus on cognitive abilities. Current research will be discussed that aims to understand how cognitive abilities (particularly executive function) are impacted by the ageing process in ASD compared to typical ageing. Finally the limitations of our current knowledge and direction of future research will be discussed. As a result of participation in this course, the learner will achieve the following objectives: (1) be able to describe the issues relating to being an adult with ASD, and (2) discuss the latest research examining the ageing process in ASD.

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Mid-Career Award Presentation: Reconsidering Harbingers of Alzheimer's Disease: Risk Factors, Biomarkers, and White Matter Hyperintensities

Award Recipient: Adam M. Brickman

8:00–9:00 a.m.

A.M. BRICKMAN. Reconsidering Harbingers of Alzheimer's Disease: Risk Factors, Biomarkers, and White Matter Hyperintensities.

The prevailing hypothesis about the pathogenesis of Alzheimer's disease (AD) suggests a cascade of biological events initiated by abnormal β-amyloid processing that leads tau-related neuronal dysfunction, neurodegeneration, and dementia. This conceptualization has directly informed current diagnostic schemes, which have evolved from diagnosing AD based on the characterization of a clinical syndrome to diagnosing AD based on the presence of amyloid and tau biological markers alone. Despite fairly consistent observations showing a relationship of vascular risk factors and frank vascular disease with AD, vascular factors have not been incorporated formally into the proposed theoretical model of AD pathogenesis or newly proposed research criteria for AD. The gradual accumulation of vascular risk factors manifest in the brain as small vessel cerebrovascular disease, which is best visualized on MRI scans as white matter hyperintensities (WMH) on T2-weighted sequences. Over the past several years we have examined systematically the contribution of WMH to the clinical presentation of AD and tested the extent to which WMH and markers of AD pathology interact. Our research shows that WMH may reflect pathology that is independent of AD pathology, conferring additive risk or contribution to symptom presentation. Our work also shows that WMH may interact more directly with AD pathology, conferring a synergistic effect on clinical outcomes, or even promoting Alzheimer's pathology directly. This talk will discuss pathogenic models of AD, review the evolution of diagnostic schemes for AD, and evaluate the role of small vessel cerebrovascular disease in AD.

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Poster Session 2. Assessment

8:00–9:15 a.m.

Assessment/Psychometrics/Methods (Adult)

D.N. ABRAMS, J.N. IKANGA, F.B. NAHAB, R.F. BREIMAN & A.Y. STRINGER. Case Report on the African Neuropsychological Battery in the Assessment of Brain Injury.

Objective: Cultural factors are important to address in neuropsychological testing due to differences in everyday knowledge, relevance of stimuli, language, and normative sample (Uzzell, Ponton, & Ardila, 2013). The African Neuropsychological Battery (ANB) is being

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developed as a culturally and linguistically appropriate measure of the impact of neurological diseases in African and African immigrant populations. We present a case comparing the use of the ANB and Western tests in the assessment of traumatic brain injury (TBI).
Participants and Methods: The patient is a 40-year-old male Togolese immigrant to the U.S. since age 32, who suffered a moderate TBI. Neuroimaging revealed reduced perfusion in the left temporal and occipital lobes, and an incidental left carotid cavernous fistula treated surgically. He is fluent in French and 4 African languages, and learned English in high school. He was evaluated using the ANB in French (his preferred language), and the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) and Wisconsin Card Sorting Test (WCST) in English.
Results: Performances on the ANB were largely consistent with those on the RBANS and WCST, particularly regarding mildly impaired verbal recall with intact perceptual motor functioning and problem-solving. However, performances on more culturally- and linguistically- laden tests were worse on the RBANS than on the ANB. Specifically, confrontation naming was severely impaired on the RBANS but mostly intact on the ANB. Learning and memory were globally impaired on the RBANS, but the ANB showed only verbal memory impairment more consistent with neuroimaging results.
Conclusions: While African and Western test batteries showed mostly concordant findings, the ANB provided results more consistent with functional imaging, particularly in areas in which cultural and linguistic factors were important. The case highlights the importance of culturally and linguistically appropriate neuropsychological measures in diverse immigrant populations in the U.S.
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J. AXELROD, L.M. GUIDOTTI BRETING, J.J. SWEET & S.K. HILL. Written and Oral Trails Paradigms: Nonequivalent Measures of Executive Functioning in a Mixed Clinical Sample.
Objective: The Trail Making Test, Part B (TMT-B) is one of the most widely used neuropsychological tests measuring executive functioning (EF). An oral version has been recommended for use in populations with motor/visual deficits. Little research has been conducted to examine the relationship between these two set-shifting measures, despite previous literature showing inconsistent findings. The Behavioral Dyscontrol Scale-2 (BDS-2) is often administered with the TMT and contains an oral set-shifting measure nearly identical to the oral TMT-B. To the extent that the Alphanumeric Sequencing Task (AST) is similar to the oral TMT-B, this test can be used to explore the relationship between the written and oral task.
Participants and Methods: This study assessed the relationship between the TMT-B and AST in a sample of outpatients seen for neuropsychological evaluation. This study also evaluated the TMT-B and AST in the context of other EF measures.
Results: In the present mixed clinical sample (n=100), performance was classified in a discrepant manner 37% of the time, with a higher rate of impairment seen on the AST (n=43) compared to the TMT-B (n=24). The correlation between the TMT-B and AST was significant (r=.433, p<.01) and was not affected by motor functioning. The TMT-B showed strong correlation with other EF tests (WCST, SCWT, D-KEFS Verbal and Design fluency) while the AST showed much weaker correlations. Moreover, the TMT-B was significantly correlated with a global composite of these measures while the AST was not. Furthermore, exploratory factor analysis extracted a one-factor solution reflective of general EF abilities, with the TMT-B loading highest on the factor and the AST loading weakly.
Conclusions: Findings indicated that 1) the TMT-B and AST are not equivalent, 2) the TMT-B and AST have poor agreement in terms of classifying patients as intact or impaired, and 3) the TMT-B appears to be a better representation of executive functioning than the AST.
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M.A. BABICZ, K. SULLIVAN, M. WEINBORN, R. BUCKS, A. NG, E. HODGSON, D. PARKER, M. PUSHPANATHAN, L. FINE, S. LOFT & S.P. WOODS. Does the Key Task Measure Prospective Memory?: Cautionary Findings from Parallel Studies in HIV Disease and Older Adults.
Objective: Prospective memory (PM) is impaired in many neuropsychological populations and can affect everyday functioning, but efficient, reliable and valid measurement is challenging. The naturalistic "Key Task" of PM, in which a patient is instructed to remind the examiner at a designated time to retrieve a set of keys (or other belonging) that has been placed out of sight, is quick and has face validity. This study aimed to examine the construct validity of the Key Task in measuring PM.
Participants and Methods: Study 1 included 162 HIV+ adults and 52 HIV- comparison participants who completed the Key Task alongside well-validated laboratory, self-report, and naturalistic measures of PM as part of a comprehensive neuropsychological battery that included assessments of everyday functioning. Study 2 used broadly parallel methods in 168 older (aged ≥ 50 years), community-dwelling Australians.
Results: In Study 1, the Key Task was not associated with HIV status, non-memory neuropsychological domains, or everyday functioning. Individuals who failed the Key Task were approximately three times more likely to fail a time-based naturalistic PM task. Better Key Task performance was positively associated with laboratory tests of time- and event-based PM, source memory, and delayed retrospective memory at the univariate level with small-to-medium effect sizes that were diminished when adjusted for education. In Study 2, performance on the Key Task was not related to any experimental, laboratory, naturalistic, or symptom-based PM measure. Nor was there a relationship between Key Task performance and function within any neuropsychological domain or everyday functioning in older community-dwelling adults.
Conclusions: Despite the appeal of its brevity and face validity, the Key Task did not demonstrate compelling evidence of construct validity or clinical usefulness in these samples of older adults and persons living with HIV disease.
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J.E. BAGGER, C.M. PARSEY & A. HANSON. Using the NIH Toolbox Cognition Battery in an Acute Meal Intervention with Older Adults: A Feasibility Study.
Objective: This feasibility study compared the NIH Toolbox Cognition battery (NTCB) to several traditional neuropsychological measures. We investigated the reliability and validity of the NTCB subtests and composite scores in a sample of older adults participating in an acute meal intervention study.
Participants and Methods: Participants were 28 community-dwelling older adults (≥55) who completed the NTCB and several traditional neuropsychological measures. Preliminary data were analyzed at Time 1 (week 1) and Time 2 (week 3).
Results: The NTCB Fluid Ability composite showed a significant relationship (p's<.01) at Time 1 with stand-alone measures of immediate and delayed story recall, category fluency, and phonemic fluency. Similar results were found at Time 2 (p's<.05) with exception of delayed story recall. The NTCB Crystallized Ability measures were not significantly different from Time 1 to Time 2 (p=.53). Significantly higher scores were found at Time 2 for the Picture Sequencing Task (p=.002), Fluid Ability composite score (p=.001), and the Total Composite score (p=.038). Age was further evaluated by creating two subgroups above and below mean age of 65. NTCB measures were not significantly different between the groups.

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Conclusions: Preliminary data demonstrate the feasibility of using NIH Toolbox Cognitive battery in a 3-week intervention study of older adults. The NTCB Fluid Ability composite demonstrated significant relationships with stand-alone neuropsychological measures of verbal fluency and story memory, providing evidence for construct validity. The NTCB Crystallized Ability composite did not significantly vary from Time 1 to Time 2 suggesting a stable and reliable measure with appropriate test-retest reliability over a brief time. Group differences were not observed when comparing subgroups of older adults, suggesting less variability in older adult performances.

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P.S. BEAN, S. HALL, M.K. REYNOLDS & C. MCFARLAND. The Effect of Test Difficulty on Self-Reported Memory Ability.

Objective: There is essentially no research examining whether taking hard or easy cognitive tests affects the examinee's sense of their cognitive abilities during the evaluation. This is important in terms of understanding the impact of the varying levels of cognitive challenge experienced during a neuropsychological assessment (e.g., rapport, applying recommendations, outcome expectations). The current study examined changes in self-rated memory ability following a difficult memory test, the Selective Reminding Test (SRT), and following an easy memory test, the Test of Memory Malingering (TOMM). A novel aspect of the study was that participants rated their memory ability during the course of the evaluation at baseline and after each memory test.

Participants and Methods: Healthy older adults (n = 33) ranging in age from 66 to 88 were recruited from the community. A within-subjects design was used that counterbalanced the administration of the SRT and the TOMM. Self-report memory ability was assessed at baseline and after each test.

Results: A repeated measures ANOVA showed a main effect for test difficulty on reported memory ability, $F(2, 64) = 54.89$, $p < .001$. Post-hoc tests showed that memory ability was rated significantly lower than baseline following the hard memory test (SRT) and significantly higher than baseline following the easy memory test (TOMM).

Conclusions: This study provides insight into the examinee's experience while taking neuropsychological tests. During an evaluation, an examinee's sense of their memory ability can vary significantly depending on the difficulty of prior memory tests. Difficult memory tests can lower their perceived memory ability while easy tests can improve their perceived memory ability. These findings have implications for the assessment process and how the examinee responds to memory challenges afterwards. Future research and applications will be discussed.

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T.W. BREARLY, N. FURST, L. TUPLER, R.D. SHURA, P. NEWMAN, J.A. ROWLAND & K. TABER. Visual Teleneuropsychological Testing by Videoconference: Examining the Role of Test Characteristics and Examinee Functional Vision.

Objective: There is strong evidence supporting videoconference-based telehealth (VBT) for provision of clinical services. A recent meta-analysis found that verbal neuropsychological tests administered by VBT were comparable to on-site administration; however, limited data exist regarding VBT for visual tasks. This study evaluated the comparability of VBT to on-site administration of visual tests and investigated whether performance decrements were associated with test characteristics or examinee functional vision.

Participants and Methods: OEF/OIF/OND veterans (N = 20) completed a test battery in both VBT and on-site conditions in counterbalanced order: Animal Naming, FAS, D-KEFS Color Word Interference Test and Twenty Questions Test, Dot Counting Test, JLO, NAB Shape Learning Immediate/Delayed Recall and Visual Discrimination, and Raven's APM. One participant was excluded from analyses due to PVT failure. Functional vision was evaluated over VBT. Analyses included z-scores for test characteristics and paired t-tests/ANOVAs ($\alpha < .05$).

Results: No differences were associated with test characteristic dichotomies (text vs. non-text, color vs. non-color). No differences were found between raw scores across tests, with the exception of Shape Learning Immediate and Delayed Recall. Functional vision for text did not account for the VBT score differences; however, qualitative examination of participant feedback indicated difficulties discriminating subtle shading differences within the same color on this test.

Conclusions: Results suggest that valid VBT administration of tasks that utilize non-color or clearly differentiated color stimuli may be feasible using existing test norms. Visual tests that require discrimination between color shades may be confounded by digital presentation, highlighting the importance of verifying relevant color-shade discrimination prior to VBT. These findings require replication in larger samples for confirmation and to further explore potential confounds.

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U. DIAZ-ORUETA, A. NAVARRO-PRADOS, A. BLANCO-CAMPAL & T. BURKE. Addenbrooke's Cognitive Examination-III: A Process-Based Approach Version for the Improvement of Cognitive Screening in Dementia.

Objective: The Addenbrooke's Cognitive Examination – Third Revision (ACE-III) is the third version of a cognitive screening instrument developed as a bedside battery for mild dementia capable of differentiating between Alzheimer's Dementia (AD) and Frontotemporal Dementia (FTD). This study presents our initial development of a qualitative version of the standard ACE-III, informed by the methodology of the Process Oriented Approach to neuropsychological evaluation, referred to as the ACE-III- Process Approach (ACE-III-PA).

Participants and Methods: A preliminary pilot study was undertaken with 20 older individuals, 11 male and 9 female (mean age= 68.9, SD = 7.93, range = 58-90) and with a mean of 12.8 years of education (SD = 3.01, range = 8-18 years), each of whom was administered the standard version of the ACE-III. The goal of the pilot study was to observe carefully participants' behaviours, strategies and types of errors when responding to the different items contained in the ACE-III screening instrument. This observation was designed to facilitate identification of the neurocognitive mechanisms likely responsible for defective test performance, without significantly affecting the original standardized administration procedures.

Results: Based on the pilot data, a new version of the test, namely ACE-III-PA, was created by means of including 'new' qualitative indices to capture the cognitive processes involved in existing subtests and incorporating 'new' qualitative classifications of error subtypes. Where deemed appropriate, complementary or satellite test conditions were also introduced to enhance subtest interpretation.

Conclusions: We propose that the ACE-III-PA can, by helping detect very subtle cognitive changes, improve upon the clinical utility of the standard ACE-III in differentiating the cognitive patterns of different MCI subtypes.

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D. CALVO, R.J. KANSER, J. VASSALLO & J. KAMPER. Utility of the 3MS and MMSE in Predicting Subcortical and Cortical Cognitive Impairment.

Objective: The Mini-Mental State Exam (MMSE) and its modified version (3MS) are among the most widely used standardized screens for cognitive impairment. While both have good reliability, the differential utility of these measures in predicting cortical versus subcortical

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dementias has not been formally examined. The current study sought to determine the utility of these measures in predicting cortical (Alzheimers disease; AD) vs. subcortical (i.e., vascular disease; VD) etiologies among veterans.
Participants and Methods: Subjects were 102 veterans (90% male, 78% White/non-Hispanic) evaluated in a large outpatient Neuropsychology clinic in 2017 and retrospectively recruited. Subjects completed a comprehensive neuropsychological evaluation for clinical care purposes, which included the 3MS with embedded MMSE. Selected subjects were diagnosed with dementia (n=45) or mild cognitive impairment (MCI; n=20) due to AD or VD following their clinical evaluation, or were healthy comparisons (HC) with no cognitive impairment (n=37).
Results: ANOVA analyses revealed MMSE and 3MS scores differed significantly across the three groups, with large effect sizes. Post hoc analyses revealed those with AD scored lower than those with VD on both measures. Logistic Regression and ROC curve analyses compared MMSE and 3MS classification accuracies. Both measures showed 'outstanding' discrimination of AD vs. HC. For VD vs. HC, MMSE discriminability was 'acceptable' whereas 3MS discriminability was 'excellent.'
Conclusions: 3MS showed superior classification accuracy in distinguishing adults with dementia/MCI from adults with no cognitive impairment. The 3MS and MMSE showed comparable discriminability for AD diagnoses, where cognitive impairments are generally more homogenous. In the case of VD, where impairments are comparably more subtle and/or heterogenous, the 3MS displayed superior discriminability. Findings suggest this enhanced classification may be due, in part, to increased sensitivity of the 3MS to subcortical disease processes.
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J. CARVALHO & B. SPRINGATE. Factor Structure of the RBANS in Patients with Huntington's Disease.
Objective: The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) is a commonly used screen of neuropsychological performance in adult patients (Randolph, 1998; 2012). A 5-factor structure is used when scoring this measure, revealing 5 composite scores that are used in clinical diagnosis (Immediate Memory; Visuospatial/Constructional; Language; Attention; Delayed Memory). This structure has been supported in a sample of older adults with cognitive impairment (Emmert et al., 2018). However, a 5-factor structure has not been consistently observed. Rather, in a sample of veterans, a 2-factor solution was noted (Carlozzi et al., 2008), as was in a large exploration of past RBANS studies (Vogt et al., 2017). We explored the factor structure of the RBANS in a sample of patients with Huntington's Disease (HD) to determine the factor structure in this sample.
Participants and Methods: Participants were 147 patients with HD who presented to an outpatient HD clinic at UConn Health Center, *M* age=46.75 (*SD*=13.35) years; *M* education=13.87 (*SD*=2.63) years.
Results: Exploratory principal component factor analysis with direct Oblimin rotation was conducted. A 2-component structure was found with eigenvalues >1 (65.1% variance). Contrary to expectations from other clinical samples, we did not find the traditional 5-factor solution. Rather, results revealed a 2-factor solution. Factor loadings generally are comprised of visually-loaded (Figure Copy, Line Orientation, Picture Naming, Figure Recall) compared to non-visually-loaded tasks.
Conclusions: Results revealed a 2-factor structure of the RBANS in a sample of patients with HD, which is contrary to the traditional 5-factor solution typically derived into composite scores with this measure. Our findings suggest that HD patients may not perform on the RBANS in a traditional manner. Thus, clinicians evaluating HD patients should exercise caution when using composite scores in the consideration of patient performance on this measure.
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J.M. CESSNA PALAS, D.M. SCARISBRICK, A. RINALDI & Z. PROCTOR-WEBER. Development of a Delayed Visual Memory Trial for the Consortium to Establish a Registry for Alzheimer's Disease (CERAD) Battery.
Objective: The CERAD is a standardized neuropsychological battery developed for differentiating dementia syndromes with norms for Veterans. A major limitation is that the battery lacks a long delay visual memory trial. The current project's purpose was to adapt the CERAD battery by supplementing the current visual memory task with a long delay recall and recognition trial; thus, enhancing the measure's clinical utility for differential diagnosis of dementia syndromes with Veterans.
Participants and Methods: This mixed clinical sample included 11 male Veterans ranging in age from 65 to 86 (mean = 76) who completed neuropsychological evaluations at a southeast VA Medical Center. Primary referral sources included mental health (25%), physiatry (33%) and primary care (25%). In addition to the long delay visual memory recall and recognition trials, neuropsychological evaluations included measures of verbal memory (CERAD word list recall and recognition), visual memory (praxis immediate recall and recognition), practical judgment and novel problem solving (Test of Practical Judgement; TOP-J), and other routine measures.
Results: Preliminary analyses (n=11) revealed relationships between long delay visual memory recall and short delay visual memory recall (r=.68, p <.05), and short and long delay verbal memory recall (r=.94, p <.001 & r=.69, p <.05, respectively). In addition, long delay visual memory recognition was related to TOP-J scores (r=.68, p<.05). In sum, significant relationships were observed between the supplemental long delay visual memory trial and measures of visual and verbal memory and executive functioning.
Conclusions: Results indicate this novel measure may provide clinically useful information for identifying and characterizing visual memory impairments in Veterans. Future research should further examine the clinical utility of this measure for differential diagnosis and evaluate reliability and validity in a Veteran population.
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S. CHOWDHRY, T. FERLAND, W. MILBERG, R. MCGLINCHEY, E. LERITZ & L. GRANDE. Digitized Clock Drawing as a Cognitive Screening Tool to Identify Executive Dysfunction in Metabolic Syndrome.
Objective: Metabolic Syndrome (MetS), the clustering of three or more cardiovascular disease risk factors, has been associated with early changes to frontally-mediated executive functions and the development of vascular-related cognitive impairment. Early identification of such cognitive changes may help identify those in need of further assessment or those needing assistance in managing risk factors, as well as help engender lifestyle changes that may serve to delay or even halt progression of cognitive decline. The present study used a digitized modification of the classic clock drawing task as a cognitive screener for executive dysfunction. We hypothesized poorer performance in participants with MetS relative to participants without MetS.
Participants and Methods: Sixty-three participants were classified into MetS (n=21) and non-MetS (n=42) groups based on current diagnostic guidelines. All participants completed the digitized Clock-in-the-Box, an experimental clock drawing measure showing good psychometric properties and high correlation with standardized measures of verbal memory and executive function. Scoring breakdown included working memory and planning/organization subscores, as well as total score.
Results: An ANCOVA, covarying for age, revealed significant group differences on working memory, $F(1,61)=11.55$, p=.001; planning/organization, $F(1,61)=5.79$, p=.019; and total score, $F(1,61)=8.98$, p=.004, with the MetS group showing consistently worse performance.
Conclusions: These results demonstrate the deleterious effect of MetS on executive function. These cognitive difficulties may negatively impact

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medical compliance, essential for controlling MetS progression and minimizing further decline. Therefore, a sensitive cognitive screening tool that identifies executive dysfunction in those with MetS is clinically useful; the present study provides preliminary evidence of the clinical utility of the digitized clock drawing task for these purposes.
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M. COCHRANE, S. VANDERMORRIS & A.K. TROYER. Examining Client Perceptions of the Neuropsychological Assessment: A Mixed Methodological Approach.
Objective: The purpose of the current study was to utilize a mixed methodological approach to understand and evaluate client perceptions and experience of the neuropsychological assessment as measured by personal goal attainment and satisfaction with the services received.
Participants and Methods: The author's retrospectively reviewed Goal Rating Forms and Client/Family Satisfaction data collected between 2013 and 2018 at a tertiary geriatric care centre. A total of 363 older adults and 184 family members completed a Goal Rating Form and 656 older adults and 253 family members completed a Satisfaction Questionnaire. Quantitative analyses of goal attainment and client/family satisfaction data were used to explore outcomes of neuropsychological assessment services. Qualitative content analysis was used to explore underlying mechanisms and active ingredients of client and family satisfaction.
Results: The vast majority of goals identified by clients and family members were either to better understand cognition or obtain recommendations or strategies, 98% of clients and 96% family members reported that they felt that they had achieved their goals at the time of completion of the neuropsychological assessment regardless of the goal type, and 91% of clients and 92% of family members reported that they were very satisfied with the care that they received. Several emerging qualitative themes including clinician factors/clinician-client empathy, provision of care, environmental factors, and general satisfaction were identified as important aspects of clients' experience related to the neuropsychological assessment.
Conclusions: This study is the first to identify and describe older adults' satisfaction and perceptions of the neuropsychological assessment, as well as personal goal attainment data. Results are discussed within the context of the application of psychology and include practice implications related to the delivery of the neuropsychological assessment.
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T. COTHRAN, L. GUIDOTTI BRETING, J.J. SWEET, E. MARTIN & J. LARSON. Multidimensional Clock Drawing: Toward Realistic Cognitive Measurement in Neuropsychology.
Objective: Clock drawing tests are among the most commonly used neuropsychological measures, but reliability of available scoring systems has been limited. Notably, these scoring protocols were empirically-driven and grounded in classical test theory. A Multidimensional Item Response Theory (MIRT) methodology was used to develop a new theory-driven scoring algorithm based on the cognitive mechanisms underlying clock drawing. The goal was to develop a reliable scoring system that could distinguish contributions of attention, construction, and executive function.
Participants and Methods: Participants were 1055 men and women (M age = 75.6; 51.3% female) referred to the neuropsychology service at NorthShore University HealthSystem from January 2012 – May 2016 who completed the CLOX clock drawing test. Item-level data were analyzed using an MIRT two-tier bifactor model to derive three hypothesized component scores from CLOX data. Multiple regression was used to test the convergent validity of these three component scores, using scores on standardized measures of attention, construction, and executive function as predictor variables.
Results: A comparison of model fit indices showed a three-dimensional two-tier bifactor model had better fit to the data than three simpler models (i.e., a unidimensional model, a one-dimensional bifactor model, and a two-dimensional two-tier bifactor model). Furthermore, differences in -2Loglikelihood values indicated the models were significantly different, $p < .0001$, respectively. Construction, executive function, and attention scores contributed significant variance to the predicted MIRT scores, $p < .05$, respectively.
Conclusions: This study represents the first use of a two-tier bifactor model in the analysis of item-level neuropsychological test data. It suggests innovative approaches to modeling other neuropsychological tests in a manner that maps onto theoretical models of cognition. MIRT has great promise for advancing the field of neuropsychology toward theory-driven measurement of cognition.
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K. BASSETT, T. GATES, J. KAMMINGA, B. BREW, R. HEATON & L.A. CYSIQUE. High functioning, urban Australian gay and bisexual men over perform on US-demographically corrected norms: A rationale for local demographically-corrected norms.
Objective: We tested the validity of US demographically-corrected (*DC*)-T-scores in high functioning gay and bisexual men who formed a control sample for a HIV study in Sydney, Australia. Because of linguistic and socio-cultural similarities, it is assumed that US norms closely approximate normal neuropsychological (NP) performance in the entire Australian population.
Participants and Methods: 71 men screened for medical, psychiatric and neurological confounds, aged 19-69 years old [M_{age}= 48±12; $M_{education}$=15±2.7; M_{FSIQ} =114±8; 95% white] completed NP assessments of fine motor speed and coordination, verbal learning/memory, working memory, psychomotor speed, mental flexibility and verbal fluency. Australian (AUS) raw scores were transformed according to US scaled scores (SS) and US *DC*-T-scores. AUS-specific SS, and then AUS *DC*-T-scores were developed using this sample's data and the same methods used for the US norms. US and AUS cognitive domain *DC*-T-scores were compared using *t*-tests. The size of demographic effects on the US and AUS on *DC*-T-scores was measured with Pearson correlations.
Results: On the US cognitive domain *DC*-T scores, the Australian sample approximated expected performance (mean ~ 50, SD ~ 10), and not differently from the AUS DC-T-scores on motor coordination (p=.96), and learning/memory (p=.43). On other US domain *DC*-T-scores, results were higher than expected, and significantly greater than the AUS-specific *DC*-T-scores [psychomotor speed (p=.0005), working memory (p<.0001), fluency (p=.05) and mental flexibility (p<.03)]. US mean *DC*-T-scores over-corrected for age (r=.20, p=.09) and education (r=-.26, p<.03). As expected, AUS mean *DC*-T-scores correctly adjusted for age and education.
Conclusions: US-based normative data should not be wholly relied upon even when assessing individuals from similar linguistic and socio-cultural backgrounds - more so in especially high (or low) functioning individuals or groups. Comparison with an Australian general population sample is warranted.
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P.V. DEVORA, S. BEEVERS & J. BENGE. Normative Data for Derived Indices from the UDS 3.0 Neuropsychological Battery.
Objective: The Uniform Data Set 3.0 (UDS 3.0) neuropsychological battery is a recently published set of tests intended for clinical research with older adult populations. While normative data for the

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core measures has recently been published, several additional commonly used scores can also be derived from this battery. The purpose of the current study is to present demographically corrected normative data for these derived indices.

Participants and Methods: UDS 3.0 scores from 1803 English speaking normal control participants were obtained from The National Alzheimer's Coordinating Center (NACC) central data repository. The following scores were calculated: Trail Making Test (TMT) A & B Discrepancy and Ratio Scores, Semantic and Phonemic Fluency Discrepancy, Craft Story Percent Retention Score, Benson Figure Percent Retention Score, Difference between Verbal and Visual Percent Retention, and an error index (sum of TMT errors and set loss/perseveration errors for phonemic fluency).

Results: Descriptive information for all the variables and derived indices is presented. Other than errors, all variables were normally distributed. In multivariate regression equations, age emerged as a significant predictor of all derived scores ($p<.001$ for all equations). Gender also emerged as a significant predictor of verbal fluency discrepancies, figure retention, and differences in verbal and visual memory. Education was a significant predictor of TMT discrepancies, figure retention, and errors. Coefficients for sex, age, and education as predictors for the derived variables are presented.

Conclusions: Neuropsychologists frequently rely on patterns of neuropsychological scores to aid in describing cognitive deficits, brain/behavior correlations, and to assist in differential diagnoses. Clinically useful normative data of such derived indices from the UDS 3.0 neuropsychological battery is presented to help researchers and clinicians interpret these scores, accounting for demographic factors.

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J. DURANT, M.J. LEAVITT, S.J. BANKS, J. BERG, J.Z. K. CALDWELL & J.B. MILLER. The Association between the WMS-IV Logical Memory Subtests and Hippocampal Volumes in a Memory Clinic Population.

Objective: Episodic memory impairment and atrophy of medial temporal lobe structures (i.e. the hippocampus) are hallmark features of Alzheimer's disease (AD). Several studies have found a positive association between hippocampal volumes (HCV) and measures of verbal and non-verbal memory. This study sought to explore the extent to which the WMS-IV Logical Memory (LM) subtests are related to hippocampal volumes in older individuals referred for memory complaints.

Participants and Methods: Records from 138 consecutive patients (Age: $M = 73.7$, $SD = 5.7$; Education: $M = 15.0$, $SD = 2.7$; 50% female) who had both neuropsychological assessment and magnetic resonance imaging (MRI) with FreeSurfer Version 6.0 volumetric analysis were reviewed. Partial correlation coefficients, accounting for age, education, and total intracranial volume (TIV) were calculated to determine the relationship between HCV and immediate and delayed recall, and recognition raw scores. Linear regression models were fit using age, education, and TIV to predict left and right HCV. LM subtests were then individually added to each model to determine the increase in predictive value of including LM.

Results: Significant positive correlations were identified between both the left and right hippocampus and each LM subtest; correlations ranged from .20 to .29. For each regression model, adding the individual LM subtests significantly improved model fit. LM performance accounted for 4.4 to 6.1% of variance in left HCV and 2.7 to 5.3% of variance in right HCV.

Conclusions: This study demonstrates a relationship between LM performance and HCV in older adults, such that individuals who perform more poorly on LM tend to have smaller HCVs. This association adds support for use of LM in cases where neurodegenerative disease might be suspected.

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O. ELKANA, N. TAL, T. BEN PORAT, S. SOFFER, L. CHOMSKY, O. REICHMAN EISIKOVITS, N. OREN & E. L. ASH. Is the Cutoff of the MoCA too high? Longitudinal Data from Highly Educated Older Healthy Adults.

Objective: Background: The Montreal Cognitive Assessment (MoCA) is commonly used to evaluate cognitive decline such as Dementia and MCI in older individuals. Several studies suggested that initially proposed cutoff of 26/30 points is too stringent while other have suggested the opposite.

Objective: To identify whether the MoCA cutoff is too stringent in highly educated older adults.

Participants and Methods: Participants and Methods: 27 participants ages 68-83 (Mean = 75.07, SD=4.62), high education level (Mean= 17.14 years, SD= 3.21) undergo cognitive assessment once a year (T0, T1, T2, T3 and T4) for five consecutive years.

The Cognitive assessments include: the Montreal Cognitive Assessment test (MoCA); Rey Auditory Verbal Learning Test (RAVLT); Rey Osterrieth Complex Figure test (ROCF); Wechsler Adult Intelligence Scale (WAIS-III) Information and Digit Span Subtest; Trail Making Test (TMT); Verbal Fluency Test and Beck Depression Inventory questionnaire (BDI). Repeated Measures ANOVA was used to analyze all standardized scores and MOCA scores. Notably, MOCA data was not standardized due to the lack of published norms.

Results: Results: Repeated measures ANOVA for the MoCA yielded significant decline across the years ($p<0.05$). From the second year and forward, the average total score of the MoCA was below the cutoff of 26/30. However, in substantial contrast, all the other average scores (RAVLT, ROCF, TMT and WAIS-III Subtest) were within the normal range and even above in all years.

Conclusions: Conclusion: Our study demonstrates that the currently used MoCA cutoff is too high even for highly educated older healthy adults. Therefore, it is crucial to create norms for the MoCA in order to avoid misdiagnosis of cognitive decline.

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S. ERLHOFF, K. RANKIN, J. KRAMER & K.L. POSSIN. Delayed Free Recall and Recognition Have Highly Similar Neuroanatomical Substrates.

Objective: Both delayed free recall and cued recognition are considered to rely critically on the medial temporal lobes, and retrieval processes employed in delayed recall are thought to recruit additional frontal-subcortical regions. We aimed to distinguish the neuroanatomical underpinnings of delayed recall and recognition on the UCSF Brain Health Assessment (BHA) Favorites test of verbal-visual associative memory.

Participants and Methods: Older adults diagnosed as neurologically healthy (N=145) or with a neurocognitive disorder (52 MCI, 93 dementia) completed Favorites and structural 3T MRI. Patients with diverse etiologies were included to reduce the impact of disease-specific patterns. For each subject, we calculated a 'retrieval impairment' index that represented the degree of improvement on delayed recognition compared to recall. Gray matter VBM was performed using SPM12, covarying for age, sex, and total intracranial volume. Results were considered significant with an FWE threshold of $p<0.05$, corresponding to $t=4.49$. Correlations were examined separately for delayed recall, recognition, and retrieval impairment scores.

Results: High performance on delayed recall (max $t=9.6$) and recognition (max $t=9.2$) each showed a robust relationship with bilateral medial temporal lobes, including the full extent of the hippocampi. The tests shared 95% of significant brain regions. Though we expected higher retrieval impairment to be negatively correlated with frontal and

subcortical brain volumes, no such regions were found to be associated with retrieval impairment.
Conclusions: As predicted, delayed recall and recognition both showed significant and robust associations with the medial temporal lobes bilaterally. However, correlations were nearly identical between delayed recall and recognition, and retrieval processing did not preferentially recruit frontal nor subcortical regions suggesting that comparison of these distinct types of memory testing may not be useful for distinguishing the extent of frontal-subcortical impairment.
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C. RADLEY, R. NANDI, A. DUTT & J. EVANS. An Examination of the Validity of the Bengali Addenbrookes Cognitive Examination III for Detecting Mild Cognitive Impairment and Dementia.
Objective: Globally, there is a need for the development of valid and reliable neuropsychological tests that are culturally and linguistically appropriate to the context in which they will be applied. The Addenbrookes Cognitive Examination III (ACE III) is a cognitive screening tool that is widely used in the dementia diagnosis process and has recently been adapted for the Bengali speaking population in India. Our aim was to examine the validity of the Bengali ACE III, evaluate the influence of demographic factors on test performance and produce appropriate normative data.
Participants and Methods: 305 cognitively healthy participants and 159 patients with cognitive impairment (Mild Cognitive Impairment or Dementia) were examined in Kolkata, India. The influence of age, education and gender on test performance was examined. Receiver Operating Characteristic (ROC) curves were constructed to determine diagnostic accuracy, with cut-points derived from optimal sensitivity and specificity values.
Results: ROC analysis in matched samples revealed that the Bengali ACE had good diagnostic accuracy for the detection of dementia (AUC = 0.952) but less good for the detection of MCI (AUC 0.748). Education had a very strong association with test performance. The association with gender was significant but weaker. Age only significantly correlated with performance when education and gender were controlled. Normative data were established stratified by education level and gender. Regression-based norms were also developed and proved to be the most diagnostically accurate with a 5% cut-off correctly classifying 92% of dementia patients.
Conclusions: The Bengali ACE III is a useful tool for screening cognitive functions as part of a dementia diagnosis process. The very strong influence of education on test performance highlights the importance of using normative data adjusted for education and other demographic variables, with regression based norms proving to be the most useful approach to the detection of impairment.
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S.A. EVANS, S.E. JOHN, L. WILLIAMS, M. WILLIS-PARKER, D. LORING & F.C. GOLDSTEIN. Establishing Test-Retest Reliability of Two Novel App-Based Cognitive Measures.
Objective: Using smartphone technology to administer cognitive measures allows for remote assessment at multiple time points, encouraging research participation by reducing barriers that may affect onsite visits. We developed two smartphone cognitive applications of the computerized Flanker Test and the paper-pencil Symbol Digit Modality Test. This study aimed to establish test-retest reliability of these two app-based measures (Arrows and Number Match).
Participants and Methods: Forty-two Non-Hispanic White and 45 Black/African American cognitively normal middle-age and older adults (M_{age} = 60.98, SD_{age} = 7.66) completed an in-clinic baseline visit that included the Arrows and Number Match measures. Study participation occurred on a rolling basis, in which 3 and 6 month re-testing was conducted remotely for each participant. We evaluated test-retest reliability at 3 and 6 months through Pearson correlations.
Results: Retention was ≥50% through remote assessment for both Arrows (75% at 3 months and 70% at 6 months) and Number Match (75% at 3 months and 50% at 6 months). The 3-month test-retest reliabilities were .54, $p<.01$ for Arrows and .64, $p<.01$ for Number Match. Test-retest reliability at 6 months was .65, $p<.01$ for Arrows and .46, $p<.05$ for Number Match.
Conclusions: Despite the promise of remote administration of cognitive tasks, our results show suboptimal test-retest reliability for these two measures, suggesting that differences in testing environment, as well as participant approach to the tasks, may be influencing performance relationships at retest. Ongoing research continues to accrue a larger sample to evaluate test-retest reliability and to establish norms overall and separately for White and African American participants.
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R.A. FORRESTER & J.A. MOSES. Common Attentional and Working Memory Factor Components Between The Serial Digit Learning Test and The California Verbal Learning Test.
Objective: Shared attentional and working memory components between a measure of rote auditory verbal learning (Serial Digit Learning-8, Serial Digit Learning-9) and the serial and semantic learning strategies used on California Verbal Learning Test (CVLT) were examined.
Participants and Methods: The sample consisted of 126 ambulatory American Veteran patients with mixed neuropsychiatric diagnosis.
Methods
All participants completed the (Benton Serial Digit-8 & Serial Digit-9), WAIS-III, and CVLT).
There were no demographic or diagnostic exclusion criteria. All participants who completed these three tests were included in the analysis.
Mean age of sample was 50.53 (SD=14.85) and mean education level was 13.19 (SD=2.48).
Principal component analysis of SDL8 and SDL9 each produced two-factor solutions (SDL8_Early and SDL8 Late trials; and SDL9_Early and SDL9_Late trials).
DSF and LNS raw scores from the WAIS-III functioned as direct maker variables for auditory attention and auditory WM. Factor scales were computed for these computed variables.
The factor scales were then analyzed with age and education.
Results: Principal component analysis of the SDL and CVLT factors was computed with DSF and LNS raw scores of the WAIS-III to produce an independent two-factor solution.
Factor 1: DSF (auditory attention) grouped with SDL8 Early Trials, SDL9 Early Trials, and the CVLT Serial Cluster Ratio.
Factor 2: LNS (auditory working memory) grouped with SDL8 Late Trials, SDL9 Late Trials, and the CVLT Semantic Cluster Ratio.
Both factors were factorially recombined with age and education. This joint variable model explained 64.6% of the total variance.
Conclusions: Individual components of auditory attention and auditory working memory are dimensionally related to factorial components serial and semantic learning strategy use in a diagnostically mixed neuropsychiatric population.
Component 1 represents trial and error, repetition-linked learning and independent Component 2 represents strategic verbal learning.
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T. GATES, J. KAMMINGA, A. JAYEWARDENE, T. VINCENT, D. QUAN, B. BREW, M. BLOCH & L.A. CYSIQUE. Four Types of Evidence-Based Change Scores Yield Similar Predictions of Cognitive Performance Change on the CogState Computerized Test Battery.

Objective: Despite increasing use of computerized cognitive batteries such as CogState in longitudinal research for many neurological and psychiatric conditions, we have limited guidance on how to monitor performance change on serial cognitive screening. To address this issue, we assessed change in a group of healthy volunteers who completed CogState at baseline and 6 months.

Participants and Methods: 57 HIV- males recruited for a NeuroHIV research program in Sydney, Australia (*Med* age=50, 65% university educated) completed a CogState battery comprising 7 measures covering attention, processing speed, verbal learning and memory. Raw scores were z-score transformed using age-corrected CogState norms (CN) and internal standardization method (IS), then averaged to create summary scores with good test-retest reliability (r_{XI}=0.78-0.80) and normal distributions. The scores were applied to 4 reliable change indices: Chelune, McSweeney, Maasen, and Within-Subjects Standard Deviation (Lewis et al., 2007) to generate change scores (CSs). Reliable change was conventionally defined using 2-tailed 90% confidence intervals. CSs were compared as continuous (z-scores) or ordinal variables (lower vs. within expected range vs. higher than expected change).

Results: A practice effect of moderate size was seen on the CN mean z-score. No significant differences between the four CS types were found regardless of whether they were derived from CN or IS and whether they were analysed continuously (Fs=0.00, p=1.00) or ordinally (largest χ^2=1.45, p=.96).

Conclusions: Norming strategy and RCI choice did not significantly impact CogState cognitive change predictions in a demographically-similar sample of Australian men. Use of summary scores is recommended over individual task measures to achieve adequate test-retest reliability and stable predictions. Replication in larger and more diverse samples would further support the robustness of evidence-based change scores when applied to cognitive screening tools such as CogState.

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K. GORMAN & A.J. GIULIANO. Inpatient Psychiatric Neuropsychology: Cognitive Screening as a Standard of Care.

Objective: Cognitive impairment is a core feature of schizophrenia-spectrum and other serious mental illnesses (SMI). Cognitive screening facilitates identification of cognitive deficits, serial monitoring, referrals for comprehensive assessment, and adaptations to enhance treatment response. We examined the utility of the Montreal Cognitive Assessment (MoCA) as a screening tool on admission to a public psychiatric hospital.

Participants and Methods: Over 2.5 years, 1487 adults (age M = 36.23, SD = 14.71; education range: <8 to 20 years) with SMI were assessed with the MoCA within 10 days of admission. Descriptive statistics and item-to-total score correlations were calculated.

Results: Of those admitted, 747 (50%) completed some MoCA items and 608 (41%) completed all items. Of the latter group (age M = 36.66, SD = 15.34), mean total score was 21.60 (SD = 5.50); 73% performed below the suggested cutoff for mild cognitive impairment (<26). Total test reliability was acceptable at α = 0.79. Corrected item-total correlations were highest for Vigilance, Trails, Clock, and Fluency (αs = 0.47) and lowest for Cube, Delayed Free Recall, Day, Date, and City (0.32-0.37). Item pass rates were highest for Year, Month, Day, Place, and City (87-96%). Item pass rates were lowest for Delayed Free Recall (5 words, 11%; 4 words, 15%; 3 words, 20%; 2 words, 16%; 1 word, 14%; 0 words, 24%), Serial Subtraction (3 points, 47%; 2 points, 18%; 1 point, 16%; 0 points, 19%), Abstraction Item #2 (Watch/Ruler, 52%), Clock (3 points, 52%; 2 points, 32%; 1 point, 12%; 0 points, 3%), and Cube (54%).

Conclusions: Findings support the feasibility of routine cognitive screening in SMI patients on admission to a public psychiatric setting. It was adequately tolerated in about 40% of cases and established a cognitive health metric for patient records. Consistent with existing literature and in the context of within-sample performance heterogeneity, most patients displayed cognitive impairment marked by weaknesses in delayed free recall and working memory.

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L. GRANDE, S. CHOWDHRY, T. FERLAND, W. MILBERG, R. MCGLINCHEY & E. LERITZ. Tablet Administration of Clock Drawing: The Digital Clock-in-the-Box.

Objective: The Clock Drawing Task (CDT) is a common measure that has been utilized as a cognitive screener. Given that it assesses a variety of cognitive processes, has strong psychometric properties and brief administration time, the CDT may be an ideal screener in the medical setting. We have developed a tablet-based Digital Clock in the Box (DCIB) for use as a cognitive screener. The current study investigated the clinical utility of the DCIB and its prediction of performance on standard neuropsychological measures.

Participants and Methods: The DCIB was presented on an iPad tablet. Written instructions were provided asking participants to select a specific response location and draw a clock set to a specific time. Drawing process and response were captured. Consistent with the paper version of this test, clocks were scored using an eight point system, with >5 classified as impaired. Sixty-three community dwelling participants completed the DCIB and a battery of clinical (neuropsychological?) measures. A factor analysis conducted on the NP variables identified four factors representing: executive function, contextual memory, verbal memory and non-verbal memory.

Results: An ANOVA, revealed that DCIB was associated with contextual memory, F(1,59)=6.520, p=.013; and non-verbal memory factors F(1,59)=4.031, p=.049.

Conclusions: These results suggest that the DCIB is predictive of performance on standardized neuropsychological measures, and that tablet administration of the CDT may be clinically useful. The DCIB was well-tolerated and may be a useful screener in the medical setting. Future work will examine the relationship of the DCIB response and drawing latencies with clinical measures.

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J. GROBERIO, R. MORIN, D. BICKFORD & R. MACKIN. Novel Prospective Memory Task for Assessment of Cognition in Older Adults with Depression.

Objective: Emerging data suggest prospective memory (PM) tasks may be sensitive to cognitive changes in late life. However, little is known about the reliability of these assessments when repeated over time and the association of PM tests with performance on other cognitive measures, including memory. Further, few studies have evaluated these relationships in older adults with major depression. The goal of this study was to investigate reliability of a novel PM task over 12 weeks and to determine association of PM with other cognitive measures in a sample of older adults with major depression.

Participants and Methods: Data were from 23 older depressed adults without dementia (M=71.9; SD=6.0) in a psychotherapy study. Participants underwent 12 weeks of psychotherapy, with cognitive testing at 1 and 12 weeks. The novel PM test required participants to learn a story to 90% at baseline. Participants recalled the story at weeks 1, 2, 4, and 12 with a primary outcome of total correct responses at each timepoint. Relationships of PM with Wechsler Memory Scale Logical Memory (LM) and other cognitive tests were assessed.

Results: Week 1 recall on the PM task was correlated with recall at weeks 2 (r=.79, p<.001) and 12 (r=.75, p=.008), with a moderate but nonsignificant correlation at week 4 (r=.40, p=.13). Additionally, initial learning of PM was correlated with learning on LM (r=.65, p=.001). Correlations between LM delay and PM recall week 2 (r=.53, p=.02) and 12 (r=.68, p=.01) were also significant. Both LM and the PM test were uncorrelated with performance on other cognitive domains, and neither were associated with baseline depression severity (p>.05 for all).
Conclusions: Preliminary data show stability of PM performance over time and concordance with a gold standard measure of episodic learning and memory. These results suggest PM tasks have promise for characterizing cognitive performance in older adults and further research on PM tests is warranted.
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D. HALLIDAY, J. GAWRYLUK, M. GARCIA-BARRERA & S. MACDONALD. Intraindividual Variability in Neuropsychological Test Performance is Associated with White Matter Integrity.
Objective: Performance fluctuations across neuropsychological testing instruments (dispersion) are traditionally linked to neurodegenerative pathology. Underlying neural correlates have remained speculative, however, in spite of white matter reductions seen with elevated intraindividual variability. Consistently, studies have controlled for artifactual age-related variance to increase measurement sensitivity of purported CNS dysfunction. In this study, dispersion was examined alongside composite scores of memory and executive functioning in healthy individuals from the Alzheimer's Disease Neuroimaging Initiative database.
Participants and Methods: 44 healthy older adults (m=72.0, SD=6.4) underwent diffusion tensor imaging and testing across a range of cognitive domains to derive composite scores of executive functioning and memory. Dispersion estimates were computed as within-person standard deviations across the neuropsychological test profile. FSL's tract-based spatial statistics were used to examine relationships between white matter, age and neuropsychological performance.
Results: Results replicated previous findings, demonstrating reduced white matter microstructural integrity with advanced age and increased integrity in high memory and executive functioning performers. Independent of age, significant associations were observed between greater executive functioning and greater microstructural integrity in the genu of corpus callosum, anterior corona radiata bilaterally, right internal capsule and right posterior thalamic radiation. In contrast, greater dispersion in performance was primarily associated with decreased white matter integrity in the body and genu of corpus callosum, anterior corona radiata bilaterally and left superior longitudinal fasciculus.
Conclusions: Dispersion is easily computed across both speed- and accuracy-based measures. Quantifying performance inconsistency with dispersion may yield novel clinical insights, and help facilitate detection of white matter damage, beyond the typical aging process.
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M. HO, K. HUANG, T. CHANG & T. LEE. Applicability of a Taiwainese Adaptation of the Dementia Rating Scale 2 in Patients with Vascular Mild Cognitive Impairment.
Objective: The Dementia Rating Scale 2nd Ed (DRS-2) has been widely used for screening Alzheimer's disease (AD). A Taiwanese adaptation of the DRS-2 was developed with sound psychometric properties. This study aimed to examine the applicability of the test to detect patients with vascular mild cognitive impairment (VaMCI).
Participants and Methods: Sixty-two stroke patients and 31 volunteers participated in this study. All underwent MRI, the Clinical Dementia Rating Scale and Mini Mental State Examination first, then had the DRS-2 three months later to ascertain cognitive impairments persisted. Two neurologists blind to the DRS-2 scores reviewed the MRI and interviewed participants for diagnoses, whereas the examiners of the DRS-2 were blind to the diagnoses. According to the American Heart Association/American Stroke Association diagnostic criteria of vascular cognitive impairment, 11 patients with possible AD were excluded, the remaining patients were allocated to the probable vascular dementia (VaD) group (n=18) and probable VaMCI group (n=33). In addition to group comparisons, receiver operating characteristic (ROC) curves were derived based on the DRS-2 scores for the VaMCI and control groups.
Results: One-way ANOVA revealed significant Group effects on all DRS-2 scores (Fs>21.48, ps<.0001). Except for the Construction scale (p=.11), the VaMCI group performed significantly worse than the control group on all scores (ps<.03). All DRS-2 scores of the VaD group were significantly lower than those of the VaMCI (ps<.001) and control groups (ps<.0001), respectively. The area under curve of the ROC for each scale of the DRS-2 ranged from 64% (the Construction scale, p=.053) to 92% (the Memory scale, p<.0001), with the Total score (94%) the highest. The cutoffs determined by Youden's index revealed only the Memory and Total scores yielded sound sensitivity (>.84) and specificity (>.91).
Conclusions: The DRS-2 may be helpful to detect patients with vascular cognitive impairment, particularly the Memory and the Total scores.
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H.M. HOLDEN, N.J. MILANO & M.D. HORNER. Five-Factor Structure of the RBANS is Supported in an Alzheimer's Disease Sample: Implications for Validation of Neuropsychological Assessment Instruments.
Objective: Development of the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph, 1998) was theoretically driven, with the goal of providing an assessment of abilities across five cognitive domains. Nearly all factor analytic studies have failed to provide empirical support for the proposed five-factor structure. A key limitation of these studies is the use of normal or mixed clinical samples, a practice that can obscure findings that may be evident in specific, homogeneous clinical samples (Delis et al., 2003). The purpose of the present study was to examine the factor structure of the RBANS in a homogeneous sample of patients diagnosed with probable Alzheimer's disease.
Participants and Methods: The sample was retrospectively identified from archival records of Veterans referred for neuropsychological evaluation through an outpatient clinic at a southeastern Veterans Affairs hospital. Participants were 107 male Veterans diagnosed with probable Alzheimer's disease. Participants were administered the RBANS using standardized procedures outlined in the test manual.
Results: Confirmatory factor analysis of a model reflecting the five Index Scores was conducted. For adequate fit, a model should have a root mean square error of approximation (RMSEA) value less than .08, comparative fit index (CFI) value greater than .90, and Tucker-Lewis index (TLI) greater than .90. In the final model, RMSEA=.06, CFI=.95, and TLI=.92, indicating good model fit. Additionally, all paths from latent variables to indicator variables achieved practical (coefficients greater than 0.3) and statistical (all p's < .01) significance.
Conclusions: The present study provides support for the five-factor structure of the RBANS. These findings suggest that the RBANS does measure five distinct constructs, and use of Index Scores is appropriate. Further, these findings highlight the importance of testing construct validity of neuropsychological assessment instruments in specific, homogeneous samples.
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L. HOYMAN, J. ROBBINS, C. BAYER, J. MURTHY, M. QUIRK, C. DAY & M. JACKSON. Performance on Reliable Digit Span vs. Reliable Digit Span-Revised in an Inpatient Acquired Brain Injury (ABI) Rehabilitation Sample.

Objective: Reliable Digit Span-Revised (RDS-R) is an extension of the well-validated Reliable Digit Span (RDS), an embedded performance validity test (PVT) on the WAIS-IV. However, there is a paucity of research on the utility of these measures in assessing effort in a severe ABI population.

Participants and Methods: Fifty-five patients on an inpatient ABI rehabilitation unit (78% Caucasian; 75% Male; Age: M=37, SD=17.38; Education: M=13.94, SD=2.83) completed a comprehensive neuropsychological evaluation as part of their rehabilitation treatment. RDS and RDS-R were calculated using manualized recommendations for cutoffs (i.e., ≤7 and ≤11, respectively). Scores were further distributed based on lower cutoffs (i.e., RDS ≤6 and RDS-R ≤10) recommended for other cognitively-impaired populations. One-way ANOVA was used to compare performance on an overall test battery mean (OTBM) for those falling above and below each cutoff.

Results: 27.3% of participants scored at or below a cutoff of ≤7 on the RDS and 7.3% using a cutoff of ≤6. Using an RDS-R cutoff of ≤11 was associated with 36.4% of participants with below-criterion scores and 16.4% at an RDS-R cutoff of ≤10. Using the RDS-R, regardless of cutoff level, also resulted in significantly higher levels of below-criterion performance compared to RDS cutoffs. Lower scores on RDS-R, but not RDS, were associated with worse performance on OTBM [F(1, 53)=3.38, p=.003].

Conclusions: Caution should be used when utilizing the standard cutoffs for RDS and RDS-R in a brain injury inpatient population as there is an increased risk of misinterpreting true cognitive deficits as suboptimal effort. Lower cutoff rates may be more appropriate for this population but should be used in addition to other PVTs. Additionally, if used, RDS may be more appropriate than RDS-R as a PVT due to a lower rate of below-criterion performance. Additionally, the RDS-R but not the RDS was associated with OTBM performance which may suggest that RDS-R is more susceptible to true cognitive deficits.

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W. WU, T. CHENG, Y. LAI, H. LIEN, M. CHIU, T. CHEN & M. HUA. A Normative Study on the Visual Naming Test and the Object Naming Test in Healthy Taiwanese Adults.

Objective: Naming impairment is often evident in patients with stroke, epilepsy and neurodegenerative diseases. The Visual Naming Test of the Multilingual Aphasia Examination and the Object Naming Test of the Neurosensory Center Comprehensive Examination for Aphasia, are sound clinical and research measures assessing both oral expression performance and core linguistic functions. Additionally, these two tests have several advantages, such as a short administration time, simple instructions, and items of different categories and levels. However, currently there is a lack of normative data for these two tests in the Taiwanese population.

Participants and Methods: Participants (N = 322) were recruited through stratified sampling by current age (ranging from 16 to 90 years old), education (ranging from 0 to 18 years), and area of residence. Thirty participants also completed the Vocabulary and Similarities subtests of the WAIS-III for the investigation of validity, and a clinical patient group was also recruited for the further validity verification. Test-retest reliability was derived from a subgroup of thirty participants.

Results: Education significantly influenced performance of the naming tests. The results also exhibited that both tests had sound construct validity and moderate test-retest reliability. The normative data revealed good representativeness, recency, and relevance.

Conclusions: Despite the moderate test-retest reliability, this study verified the adequate validity of the two naming tests. Further investigations on the test-retest reliability and the qualitative scoring system appear necessary in order to detect changes in oral expression and aphasic symptoms, and monitor the outcome of neurocognitive rehabilitation.

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I.J. HUNT, R. NARVAEZ, A. CHOATE, K. CARAHER, M. BASSO & D. WHITESIDE. Stratified Performance on the TOMM is Associated with Differential Responding on the PAI.

Objective: The Test of Memory Malingering (TOMM) is a sensitive and specific measure used to assess performance validity. It is generally regarded as a dichotomous pass /fail measure with a specific cut-off (<45). To our knowledge, no studies have considered TOMM as a stratified variable to evaluate variables associated with different levels of TOMM performance. It is hypothesized that demographic or personality characteristics (measured by the Personality Assessment Inventory) will be related to various levels of TOMM performance.

Participants and Methods: Archival data for 760 neuropsychology patients from the senior author's previous clinical practice were analyzed. Patients were placed in one of 5 groups based on TOMM trial 2 performances:
1. Chance/below chance fail (TOMM≤29, n=17); 2. Mid-range fail (TOMM=30-39, n=41); 3. High fail (TOMM=40-44, n=82); 4. Low pass (TOMM=45-48, n=152); and 5. High pass (TOMM≥49, n=468). Differences among TOMM groups in mean PAI scale scores were analyzed using one-way ANOVA.

Results: TOMM groups differed in mean scores for: Negative Impression Management (NIM; F_4=12.03, p<.001), ANX (F_4=3.8, p=.005), DEP (F_4=5.5, p<.001), SCZ (F_4=7.9, p<.001), and SUI (F_4=4.8, p=.001). With the exception of SUI, all of these scales remained significant (p < .05) in robust Welch ANOVAs. Post hoc analysis (Hochberg) revealed the Chance/below chance group with the highest PAI scales. PAI differences between the high fail group and passing groups were smaller and not significant on PAI scales.

Conclusions: Our preliminary findings suggest that there are important differences on personality assessment among groups performing at various levels on the TOMM. Chance/below chance performance was associated with particularly pathological responding on the PAI. Future research could provide useful information to help distinguish among individuals giving distinct levels of effort.

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I.J. HUNT, D. WHITESIDE, A. CHOATE, R. NARVAEZ, K. CARAHER & M. BASSO. The Perceptual Memory Test as a Performance Validity Index.

Objective: The Perceptual Memory Test (PMT) is a new performance validity test based on selected stimuli from the Mooney Closure Test (MCT; Mooney & Ferguson, 1951), a rarely used visuoperceptual measure. The current study utilized selected stimuli from the MCT in order to create a new stand-alone performance validity test (PVT) called the Perceptual Memory Test. The PMT includes 15 degraded images of common objects, rendering them difficult to recognize. Participants attempt to identity them. Subsequently, the image is clarified and its identity explained. Three (PMT-3) and fifteen (PMT-15) minutes later, examinees are again shown the stimuli, and asked to identify them. A forced choice recognition (PMT-FC) trial follows.

Participants and Methods: Participants were neuropsychology patients (n=22, 67% female, mean age=49.3±17.5) with credible performance and a simulator group of undergraduates instructed to appear cognitively impaired (n=42, female=28, mean age=21.5±2.7). Receiver operating characteristic (ROC) analysis was used to determine classification accuracy and optimal sensitivity and specificity by comparing the simulator group against clinical participants.

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Results: PMT-3 had relatively low sensitivity (29%) but appropriate levels of specificity (91%) at a cutoff score of 8/15 items correct. PMT-15 was a more effective tool for distinguishing the simulator group from clinical patients on PVTs (sensitivity=69%, specificity=91%, cutoff at 11/15). PMT-FC was similarly useful (sensitivity=71%, specificity=100%, cutoff at 14/15). For comparison, PMT-15 and PMT-RC were highly similar to the first trial of TOMM (sensitivity =81%, specificity=91%, cutoff at 41/50) and the second trial of TOMM (sensitivity=79%, specificity=95%, cutoff at 45/50).
Conclusions: Preliminary findings supported the PMT-15 and PMT-FC as a PVT with good sensitivity and specificity. Additional research with diverse clinical samples is recommended to further validate the measure.
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J. HURTUBISE, L.A. ERDODI, C.D. SIRIANNI, N.M. MCVINNIE & A. MCDERMOTT. Embedded Validity Indicators Within the Hopkins Verbal Learning Test-Revised are Specific to Non-Credible Responding – A Study on Experimental Malingering.
Objective: Embedded validity indicators (EVIs) assess performance validity within established tests of cognitive ability. Several EVIs have been published within the California Verbal Learning Test but similar research using the Hopkins Verbal Learning Test – Revised (HVLT-R), a more cost-effective measure of verbal memory, is scarce. Previous studies that explored the utility of the HVLT-R Recognition Discrimination (RD) as an EVI reported highly conservative cutoffs required to maintain .90 specificity. This study was designed to cross-validate the classification accuracy of the RD in a different sample, and introduce a newly developed forced choice recognition (FCR) trial within the HVLT-R.
Participants and Methods: Data were collected from 65 undergraduate students from a midsized Canadian university (86% female). Invalid performance was operationalized in three different ways to provide an engineered method variance: 1) Random assignment to the experimental malingering condition; 2) A score ≤47 on the Word Choice Test or an age-corrected scaled score of ≤4 on the D-KEFS Trails 4.
Results: Both EVIs within the HVLT-R were highly predictive of all three criterion variables (AUC: .78-.93). RD ≤7 produced a good combination of sensitivity (.38-.63) and specificity (.91-.98). Increasing the cutoff to ≤8 resulted in a predictable trade-off between sensitivity (.43-.63) and specificity (.89-.96). Making any error on the FCR (≤11) was sensitive (.62-.86) and specific (.87-1.00) to non-credible responding.
Conclusions: Data support the use of more liberal cutoffs on RD without a considerable increase in false positive errors. In addition, the newly introduced FCR trial, a cost-effective optional task, shows promise as an additional EVI that can enhance the HVLT-R's potential to differentiate between valid and invalid response sets. However, replication in patients with genuine neurocognitive deficits and against different criterion measures is needed before the FCR can be recommended for broad clinical use.
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A. JANSARI. The Jansari assessment of Executive Functions (JEF©): A new ecologically-valid tool for assessing EFs using virtual reality.
Objective: Due to their ubiqitous involvement in cognition, difficulties in executive functions (EFs) can significantly impact behaviour. While some neuropsychological assessments are able to assess these impairments, increasingly, clinicians are seeing patients who pass them whilst still exhibiting difficulties in day-to-day living. Calls have therefore been made to develop tools that are more sensitive and ecologically-valid. The Jansari assessment of Executive Functions (JEF©) is a new tool run on a standard laptop developed to address this need using virtual reality.
Participants and Methods: JEF© is a set within a business office which mimics aspects of the Multiple Errands Task. Performance is evaluated on subtasks designed to test eight EF constructs: Planning, Prioritisation, Selective-Thinking, Creative-Thinking, Adaptive-Thinking, Action-Based Prospective Memory (PM), Event-Based PM and Time-Based PM. The sensitivity of JEF© for assessing EFs in adults with TBI was evaluated. Then a series of experiments investigated its utility with patients with focal frontal lesions, elderly men taking medication for prostate cancer, athletes who may suffer Chronic Traumatic Encephalopathy (CTE) through contact sports and ex-criminals who may have suffered closed head injuries.
Results: Results consistently show that JEF© is able to identify differences in EFs between healthy controls and patients with TBI or frontal lesions, men on medication for prostate cancer, individuals with possible CTE and ex-criminals. Further, it shows higher correlations with two subjective self-report measures (DEX and PCRS) than measures from the DKEFS, BADS, WCST and MIST.
Conclusions: JEF© is a safe ecologically-valid task that has potential for becoming a standard assessment of EFs. With performance being evaluated across eight constructs, it also offers a post-assessment tool for targeting specific rehabilitation. Currently, clinicians in 13 countries are using JEF© or translated versions to explore appropriateness for their cultures.
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A. KRAMER, K.B. CASALETTO, A. UMLAUF & J. KRAMER. Robust Normative Standards for the CVLT-II Ages 60-99: A Tool for Early Detection of Memory Impairment.
Objective: To detect pathological changes or "impairment," neuropsychologists rely on normative data to compare cognitive performance to "normal" peers. However, the true normality of normative data may be called into question given the high prevalence of preclinical proteinopathies amongst clinically normal older adults. Careful phenotyping of participants included in normative standards is critical to upholding sensitivity, yet is often not available due to limited resources. Given its common use in memory clinics, we aimed to develop a robust California Verbal Learning Test-II (CVLT) normative standard reflecting the most cognitively stable sample of older adults available.
Participants and Methods: 249 older adults (mean age=70.2, range 60-99, 87% White) who were clinically normal at baseline and demonstrated clinical stability on longitudinal assessment completed the CVLT at baseline. We applied a standardized algorithm to convert raw scores into normalized scaled scores. These were then regressed on age, sex, and education using fractional polynomials. Finally, we compared scores obtained via our robust norms to those obtained by the CVLT-II and CVLT-3 normative standards in older adults.
Results: There were significant main effects of age (Partial R^2=0.08-0.19) and sex (Partial R^2=0.02-0.1) across CVLT metrics, but not education (Partial R^2=0.01-0.02). Means and standard deviations were higher and less variable in our robust normative sample than the samples used to create the CVLT-II and CVLT-3 normative data (Cohen's d=1.09-2.44, ps<.05).
Conclusions: These robust longitudinal normative data demonstrate increased sensitivity (higher standard of expected performance) for detection of memory changes in aging adults compared to the CVLT-II and CVLT-3 normative data. These norms may help clinicians identify patients with memory and potential neurodegenerative changes in the earliest stages, further optimizing clinical management and clinical trial stratification.
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C. LAWN, L. ALLEN, K. MCENANEY, O. CLAVIER & R.M. ROTH. Usability of the Self-Administered Neuropsychological Assessment Battery.

Objective: Use of speech recognition software for medical applications is becoming more feasible. The Self-Administered Neuropsychological Assessment Battery (SANAB) is a tablet-based test battery (verbal and visual memory, attention, processing speed, spatial, and executive) with instructional videos and speech recognition for hands-free, automatically-scored responses. We examined whether there are gender or age differences in SANAB usability.

Participants and Methods: Participants included healthy younger (18-55 years) and older (56-80 years) adults with TOPF estimated premorbid IQ ≥ 70. A *pilot study* included 10 younger (6 women) and 12 older (8 women) participants, and after further refinement of the SANAB, the *main study* had 16 younger (11 women) and 24 older (17 women) participants. SANAB was administered via iPad with wired headset and microphone. A usability questionnaire with a Likert type scale was administered after the battery.

Results: There were very few gender, age, or interaction effects. Overall, in both studies ratings indicated a positive experience, ease of software use, and largely "neutral" test difficulty. Pilot study older adults rated the SANAB as slightly less easy to use, though scores were within "neutral" range, and had a slight preference for having a technical person available. In the main study, these effects were also observed, but only for older males. With respect to specific tests, in the main study the verbal memory test was rated as slightly more difficult by men than women.

Conclusions: Participants generally rated the SANAB as easy to use and of largely neutral test difficulty, with age effects unrelated to familiarity with computer use. We are currently assessing the test-retest reliability, convergent and discriminant validity, and usability and sensitivity in several clinical conditions. We expect the SANAB to be a useful new tool to screen for cognitive impairment, especially in patients with limited upper extremity use.

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P. LEE MEEUW KJOE, J. AGELINK VAN RENTERGEM, I. VERMEULEN & S. SCHAGEN. Correcting for Level of Computer Experience in Online Cognitive Testing: is it Necessary?

Objective: Differences in performance on computerized neuropsychological tests may be explained not only by differences in cognitive ability, but also by differences in computer experience. When comparing patients to normative data, thus, the question is whether computer experience should be corrected for. This study aimed to investigate the need to correct for computer experience by examining its influence on online and traditional tests.

Participants and Methods: 248 typical Dutch-speaking adults aged 18 to 81 completed an online neuropsychological test battery (Amsterdam Cognition Scan). 70 healthy adults aged 18 to 74 completed traditional equivalents of the online tests. Computer experience was measured by 1) a computer skills test measuring clicking, dragging and typing, and 2) self-reported computer use per week. Multiple regression analyses were applied to examine the influence of tested and self-reported computer experience on the online and traditional cognitive tests.

Results: We found that after correcting for age, sex and education, tested computer skills were associated with both online and traditional cognitive tests, predominantly but not exclusively speed-based tasks. Tested computer skills were highly correlated with age. Self-reported computer use was associated with online tests, approximately the same tasks, but not with traditional cognitive tests. Self-reported computer use was moderately related with age.

Conclusions: Better performance on the computer skills tests was not only associated with better performance on online tests, but also on traditional tests. Therefore, correcting for these computer skills would also remove important components of neuropsychological test performance. Self-reported computer use was only related to performance on online tests, and not traditional tests. However, amount of computer use may also be affected by disorders, making it also inappropriate to control for this variable.

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G.J. LEE, N. ALLAN & J. SUHR. Relationship Between Self-Reported Attentional Control and Neuropsychological Performance in Older Adults: Psychological Symptoms as Moderators.

Objective: Attentional control, the capacity to focus and shift attention between tasks, has been shown to decline in normal aging and age-related medical conditions. However, it is unclear whether subjective reports of attentional control are consistent with objective test performance. Thus, we examined the relationship between self-reported attentional control and performance on neuropsychological tests. We hypothesized that, as in self-reported memory, level of psychological symptoms may moderate the relationship between self-report and test performance.

Participants and Methods: Fifty-three healthy older adults (74% female, mean age 68.36, SD = 9.25) completed a brief battery of self-report measures and neuropsychological tests as part of a larger study on sleep. Variables of interest included self-report measures of attentional control, depression, anxiety, and perceived stress. The Trail Making Test (TMT), Stroop Color and Word Test (SCWT), as well as the Digit Span and Coding subtests of the Repeatable Battery for the Assessment of Neuropsychological Status were analyzed as attention measures.

Results: Self-reported attentional control was not significantly correlated with test performance. Both depression and perceived stress were moderators of the relationship. Higher self-reported attentional control was significantly correlated with higher SCWT color-word performance only among those who reported lower levels of depression ($r = .575$, $p = .006$) or lower levels of perceived stress ($r = .454$, $p = .017$). Anxiety level did not moderate relationships between self-reported attentional control and test performance.

Conclusions: Findings indicate that, as in self-reported memory, the relationship between self-reported and objective attentional control is moderated by psychological symptoms. This suggests that clinicians should not interpret results of an evaluation solely based on either self-report or test performance, particularly when patients endorse higher levels of depression or perceived stress.

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D. LEITNER, J. UPSHAW, G. ARMSTRONG, J. HANSEN, H. MILLER & M. LIBBEN. The Association of Eye Tracking with Computerized and Traditional Neuropsychological Testing: A Pilot Study.

Objective: The association between eye movements and cognitive processes has garnered increased interest (Thomas & Lleras, 2007). Eye tracking studies have engendered advances in our understanding of memory, mental imagery, problem-solving, and decision making (Rayner, 1998; Richardson & Spivey, 2004). However, in the clinical setting, no studies have examined how eye tracking (ET) may augment cognitive assessments, such as the Wisconsin Card Sorting Test.

Participants and Methods: One-hundred twenty-nine undergraduate students, 18 to 42 years of age ($M = 20.6$ $SD = 3.1$) were included in the study (66% female). All participants completed the WAIS-IV Coding and Digit Span, Trail Making Test, and Consonant Trigrams ('traditional tests'), and self-report measures for anxiety, alertness, and computer proficiency. Participants were randomized to a low, medium, or high cognitive load group (LCL, MCL, HCL, respectively) to complete the computerized WCST (cWCST) while eye movements were recorded. Saccades, dwell time, fixation counts, and average fixation time were recorded.

Results: Dwell time and fixation count were lowest for the LCL group. Correlations between ET measures and scores ranged from weak to strong (r = .00 to .68), with stronger correlations associated with error scores and categories completed. Weak to moderate correlations were found for ET measures and scores on 'traditional tests' (r = .00 to .43). Hierarchical regression revealed dwell time and average fixation time were significant in predicting perseverative errors and number of categories completed (R^2 = .50 and .36, respectively) above and beyond demographics and traditional test scores.
Conclusions: Incorporating ET into the cWCST may augment traditional testing procedures by providing valuable information regarding visual attention during problem solving. Further research is required to see if results are replicable in clinical populations and if ET can provide similar benefits with other computerized tests.
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D.A. LOWE, C.M. NGUYEN, C. COPELAND, D.J. HEYANKA & J. LINCK. Factor Analysis of the Texas Functional Living Scale in an Outpatient Clinical Sample.
Objective: The Texas Functional Living Scale (TFLS) is a promising performance-based measure of instrumental activities of daily living (IADLs) that warrants further evaluation of its psychometric properties. A prior exploratory factor analysis (EFA) in a veteran sample supported four factors that did not correspond to the published subscales (Gonzalez et al., 2017). This study clarified TFLS factor structure in a non-veteran, mixed clinical sample.
Participants and Methods: The sample consisted of 270 adult outpatients at a neuropsychology clinic (M age = 70.99, SD = 12.25; 49% women; 87% Caucasian). Final neurocognitive diagnoses were no diagnosis (28%), mild neurocognitive disorder (NCD; 29%), and major NCD (43%). Patients completed the TFLS as part of standard clinical procedures. EFA was conducted with the 24 TFLS items with age and education partialed out.
Results: Principal axis factor analysis with oblique promax rotation indicated seven factors with eigenvalues greater than one. The first factor independently explained 26% of the variance. Parallel analysis indicated five factors for extraction that accounted for a combined 48% of the variance. Inspection of factor loadings suggested the following factor interpretations: complex calculations and time, complex visual search, praxis, memory, and basic calculations/math concepts. Five items did not significantly load onto any of the factors.
Conclusions: The TFLS factor structure in an outpatient clinical sample did not entirely correspond to the published subscales or prior EFA results in a veteran sample. Current results suggest that complex financial and numerical abilities contribute most strongly to TFLS Total scores. The TFLS should be analyzed in other clinical samples to further clarify its factor structure.
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L.M. MANDERINO & J. GUNSTAD. ImPACT Baseline Performance in Individuals with Clinical Elevations in Self-Reported Psychological Symptoms.
Objective: Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) assesses cognitive function in concussion, though concern regarding validity in subpopulations of athletes (e.g., those with neurocognitive diagnoses) exists. Little research has demonstrated effects of psychological symptoms on ImPACT. The present study examines the relationship between ImPACT composite scores and psychological symptoms.
Participants and Methods: As part of a larger study, 134 college students completed ImPACT and the Minnesota Multiphasic Personality Inventory–2–Restructured Form (MMPI-2-RF). Bivariate correlations examined relationships between relevant MMPI-2-RF scales (EID, RCd, RC2, RC7, BXD, RC4, RC9; chosen for prevalence in a college population and likely effect on cognitive function) and ImPACT composite scores. Individuals were grouped by MMPI-2-RF clinical elevations, and T-tests examined whether groups differed on ImPACT composites.
Results: Correcting for multiple comparisons, none of the included MMPI-2-RF clinical scales were significantly correlated with ImPACT composite scores (p ranged from 0.04 to 0.97; r ranged from 0.00 to -0.18). T-tests revealed that individuals with no clinical elevations (n=59, M=87.20, SD=10.60) performed significantly better on Verbal Memory than individuals with at least one elevated clinical scale (n=75, M=83.00, SD=11.87), t(132)=2.13, p<0.05. Individuals with no elevations (M=0.35, SD=0.14) also performed faster on the Cognitive Efficiency Index than those with at least one elevation (M=0.29, SD=0.15), t(132)=2.16, p<0.05.
Conclusions: ImPACT composite scores are not correlated with psychological symptoms overall, but individuals with clinical elevations performed worse on two ImPACT composite scores. This examination serves as preliminary evidence that individuals with psychological diagnoses may be a subpopulation for whom intraindividual score comparison may not accurately capture concussion-related changes to cognitive function. The need for separate norms should be considered.
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C. MILLS, N. ALLEN & M. REINHARD. Neuropsychological Performance Validity Assessment of Veterans with Comorbid Chronic Mood and Pain Diagnoses.
Objective: Veterans have complex medical histories that include cognitive and psychological deficits, thereby increasing the need for neuropsychological evaluations. In an attempt to reduce the risks of false-positive cognitive diagnoses, performance validity measures are given. However, research on these measures tends to only assess diagnoses individually and not consider comorbidities. This poster compares profiles on the Green's Word Memory Test (WMT), a performance validity test, in Veterans 1) without symptoms of mood disorders or pain; 2) with current clinically significant symptoms of depression, anxiety, and PTSD; and 3) with chronic pain and current clinically significant symptoms of depression, anxiety, and PTSD.
Participants and Methods: Cognitive functioning was assessed in 25 Veterans (age M = 46.8, SD = 9.9) with complex medical histories at a VA Medical Center as part of a comprehensive medical evaluation. The WMT evaluated performance, while the Beck Depression Inventory II, Beck Anxiety Inventory, PTSD Checklist for DSM-5 and Wong-Baker FACES Pain Rating Scale assessed symptoms for grouping. ANOVA was conducted to evaluate performance on the WMT subtests for each patient group.
Results: The results failed to indicate a significant difference between the three groups [Immediate Recall: F(2, 22) = 3.0, p = .07; Delayed Recall: F(2, 22) = 1.4, p = .26; Consistency: F(2,22) = 1.4, p = .26]; Multiple Choice: F(2,22) = .33, p = .723; Paired Associates: F(2,22) = .35, p = .71], likely due to small sample sizes. However, there is a general trend of a decline in performance (i.e., effort) as the number of comorbid diagnoses increase, that is also less than the WMT normative sample.
Conclusions: The findings suggests that a multitude of factors may negatively impact performance validity and neurocognitive test results, and should guide clinicians in interpreting findings and determining whether the presence of health factors have influenced cognitive functioning.
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C.O. NESTER, C.G. QUINN, K. EVERSOLE, A. BONNER-JACKSON, J. HIRSCH, N. PARE, D. BLACKWOOD, C. BLOCK, A. BOZOKI, G. SPREHN & L. RABIN. Test of Practical Judgment (TOP-J) Performance Among Clinically Diverse Older Adults.

Objective: Judgment, an aspect of executive functioning, is essential to many aspects of daily living among older adults. In clinical settings, the assessment of judgment is crucial to differential diagnosis, patient-care planning, and recognizing potential for abuse or neglect. The Test of Practical Judgment (TOP-J; Rabin et al., 2007) is used by many clinical neuropsychologists in the assessment of judgment; however, no clinically-derived norms have been established. The current study presents essential normative standards across various diagnostic groups.

Participants and Methods: Data were drawn from clinics (N=7) located across the U.S., providing 356 patients (Age M=72.1, SD=8.6). A wide range of diagnoses was represented, including: Alzheimer's disease (AD), vascular dementia (VaD), mixed dementia, frontotemporal dementia (FTD), dementia Lewy body (DLB), Parkinson's disease (PD), amnestic mild cognitive impairment (aMCI), non-amnestic MCI (naMCI), multiple domain MCI (mdMCI), and essential tremor (ET). Participants were retroactively selected and a large de-identified dataset was compiled, consisting of relevant demographics, TOP-J scores, and neuropsychological data.

Results: TOP-J scores for patients with AD (M=16.6, SD=4.6) did not significantly differ from previously published norms (M=16.2, SD=4.8); $t(58) = .682$, $p=.498$, while scores for patients with aMCI (M =21.1, SD=2.9) were higher than original norms (M =20.2, SD=3.4); $t(53) = 2.342$, $p=.023$. VaD (M=16.2, SD=5.3), AD, and FTD (M=17.2, SD=3.5) groups demonstrated the lowest average TOP-J scores, while ET (M =20.3, SD=2.9), mdMCI (M=20.7, SD = 3.5), and aMCI exhibited the highest scores.

Conclusions: Study results revealed distinct cross-diagnostic performance on the TOP-J, indicating differential judgment abilities associated with various patient groups. Existing norms are only available for AD, aMCI, and healthy participants; these expanded and updated norms enhance the utility of the TOP-J across a broader clinical range.

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T.T. NGUYEN, J. GRABYAN, T. WEBBER, L. NICCOLAI, R. COLLINS & D.K. CHEN. Validation of the Miller Forensic Assessment of Symptoms Test for Predicting Failure on the Structured Interview of Malingered Symptomatology in a Seizure Disorder Sample.

Objective: Assessment of symptom exaggeration has become an increasingly important topic in neuropsychological evaluations. The need to detect feigned symptoms gave rise to symptom validity tests (SVTs), such as the Structured Interview of Malingered Symptomatology (SIMS) and the Miller Forensic Assessment of Symptoms Test (M-FAST). Symptom invalidity rates/patterns can vary between clinical populations, so it is important that measures be individually validated in dissimilar settings. While the SIMS has been validated in epilepsy long-term monitoring units, the M-FAST has not; the present study seeks to fill this gap. It was hypothesized that failure on M-FAST would predict failure on the SIMS with high sensitivity and specificity in a seizure disorder sample.

Participants and Methods: Subjects were 131 inpatient veterans referred for neuropsychological screening as part of a week-long inpatient observation on an epilepsy monitoring unit. Patients were administered the SIMS and the MFAST as part of a larger battery.

Results: Using a SIMS total cut-score (previously validated in this population) of ≥21 as indicative of failing the overall measure, M-FAST cut-scores of ≥7 yielded the highest sensitivity (.40) while maintain a specificity (.93) of at least .90. Youden's Index of receiver operator characteristic (ROC) analysis suggested lower cut-scores as more advantageous, but at the risk of increasing false positive rates (via low specificity) to unacceptable levels.

Conclusions: M-FAST shows good classification statistics in predicting SIMS performance in a seizure disorder sample, suggesting it may be used clinically in this population to determine symptom validity. Nevertheless, utilizing a robust combination of SVTs validated for use in seizure disorder populations – both interview-based (e.g., M-FAST) and self-report (e.g., SIMS) – may prove to be of particular clinical value.

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M.E. NITTA, B. MAGNUS, P. MARSHALL & J. HOELZLE. Item Response Theory Analysis of the Adult ADHD Current Symptoms Scale: Consideration of Item Functioning and Task Engagement.

Objective: Attention deficit/hyperactivity disorder (ADHD) presents differently in adulthood, though diagnostic criteria reflect childhood symptom presentations. ADHD symptoms are equally weighted in diagnostic criteria, despite some ADHD symptoms being frequently endorsed in normative samples. This study evaluated Current Symptoms Scale (CSS) item level functioning using the graded response model (GRM) from item response theory (IRT).

Participants and Methods: Each patient (N=400) completed the CSS during a multimethod ADHD evaluation. IRT was used to investigate how self-reported items/symptoms represent latent traits of inattention (IA) and hyperactivity/impulsivity (H/I). The GRM was used to estimate thresholds (β's) and a discrimination parameter (α) for each item. Analyses were repeated after excluding patients meeting criteria for malingered neurocognitive dysfunction (MND; n=106).

Results: IA and H/I subscales were unidimensional and evaluated as two measures. Discrimination parameters for IA items ranged from α=2.18 (*forgetful in daily activities*) to α=1.08 (*avoids tasks*). Discrimination parameters for H/I items varied from α=1.95 (*difficulty awaiting turn*) to α=1.19 (*fidgets)*. IA item, *easily distracted*, and H/I item, *fidget*, exhibited the lowest threshold parameters. Item parameters did not meaningfully change after excluding MND patients.

Conclusions: This research evaluated how CSS items relate to corresponding latent traits in an adult patient population. CSS items, which represent ADHD diagnostic symptoms, are variably related to IA and H/I. Compared to items measuring IA, items assessing H/I symptoms better discriminate between higher and lower levels of the H/I trait; items assessing IA are less effective in differentiating among patients at varying levels of the IA trait. Evaluation of threshold parameters reveal some items are likely to be endorsed by patients with lower latent trait levels. Overall, this research is useful in identifying which ADHD symptoms most likely reflect latent traits of IA and H/I.

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W. OOMENS, R. MAES, F. HASSELMAN & J. EGGER. A Time Series Approach to Random Number Generation: an Evaluation of Construct Validity.

Objective: Random number generation (RNG) has seen some use in the assessment of executive functioning (EF). However, there is still much unclear about how the RNG test relates to more traditional measures of EF. Behavior and cognition, especially EF, are nonlinear phenomena, while our current understanding of EF is based on linear statistics. Therefore, stochastic analysis of cognition and EF is under debate. In the current study we firstly recapitulate the RNG literature and secondly we investigate the validity of the RNG by applying nonlinear recurrence quantification analysis (RQA) to our RNG data and relate these nonlinear measures to a broad range of (traditional) EF tasks in a clinical population.

Participants and Methods: 137 in- and outpatients administered for assessment to the Centre of Excellence for Neuropsychiatry in Venray were included in the current study. The assessment procedure included

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both traditional and experimental EF tasks as well as a global IQ measure. Furthermore, the RNG test was administered to all patients as part of the assessment procedure. RQA output measures were correlated to both IQ and EF measures.
Results: Holm corrected Pearson product correlations did only exceed significance levels for global IQ and RQA, but not for any measures of EF and RQA. Supplementary analysis of supgroups, based on IQ and RNG results, did not change these results.
Conclusions: In the current clinical sample, the RNG test does not correlate with traditional tasks of EF. These findings are consistent with the limited correlations described in the scientific literature and suggest that RNG assesses EF in a different way than traditional tasks do. This fuels the ongoing unity-diversity debate of EF, but also signifies the importance for other methods to quantify EF. Methods that are sensitive to especially the nonlinear patterns in EF.
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J.H. ORY, D.A. LOWE, C.M. NGUYEN, K. WALL, C. COPELAND & J. LINCK. Demographic and Occupational Influences on Grip Strength.
Objective: The Heaton norms suggest grip strength increases with education. Instead, occupational activity may be more strongly related to grip strength. This research empirically analyzed whether grip strength was associated with education or occupation.
Participants and Methods: We examined the propriety of calibrating grip strength scores on the Hand Dynamometer according to years of education and occupational attainment in a clinical sample of Caucasian adults (N = 1706; M_{age} = 49.95 +/- 14.79 years; M_{educ} = 14.38 +/- 2.86 years; 41.6% women) with unskilled (e.g., laborers), semi-skilled (e.g., operators), skilled (e.g., craftsmen/foremen), administrative, and professional occupations after controlling for age and gender effects.
Results: Effect sizes for dominant and non-dominant grip strength were small for age (rs = -.23 and -.24, respectively), large for gender (r_{pb}s = .66 and .64), and negligible for education (rs = .001 and -.017). ANCOVAs indicated significant grip strength differences between occupations after controlling for age, gender, and education in each hand (ps <= .02). Bonferroni-corrected post-hoc analyses denoted a significantly weaker dominant grip strength for semi-skilled versus skilled and administrative occupations (ps < .01) and similar non-dominant grip strength between occupations.
Conclusions: Contrary to indications in the Heaton norms, occupation but not education was a salient feature of grip strength in this study's large clinical sample. Consequently, education-calibrated norms may overestimate impairment for highly-educated patients. Underlying explanations for present, mixed findings are as yet unclear and merit future investigations.
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V.C. PERSINGER, D. WHITESIDE, L. BOBOVA, S. SAIGAL, M. VANNUCCI & M. BASSO. Using the California Verbal Learning Test, Second Edition as an Embedded Performance Validity Measure Among Individuals with TBI and Individuals with Psychiatric Disorders.
Objective: Given the need for performance validity tests (PVT) resistant to coaching (Whiteside et al., 2015) several measures from the California Verbal Learning Test-II (CVLT-II) were studied, including Total Hits (TH), Total False Positives (TFP), the Wolfe et al. (2010) logistic equation, the discriminant function analysis of Sweet and colleagues (2000), Immediate Recall Total (1-5), Long-Delay Cued Recall, Discriminability, and Forced Choice Recognition. ROC analyses were calculated to evaluate classification accuracy.
Participants and Methods: Participants (N=176; mean age = 46.31(15.30); mean education = 13.07 (2.50), 52.3% males; 91.2% Caucasian) were consecutive neuropsychological outpatients with either psychiatric disorders (Psych) or mild traumatic brain injury (MTBI). Credible and non-credible performance groups for both Psych and MTBI were created based on the criteria of failing 2 or more established PVTs. A third group consisted of moderate to severe traumatic brain injury (M-STBI) patients who passed all PVTs.
Results: For TH, when specificity = .90, sensitivity (SN) = .47 in psychiatric patients and in the MTBI group, SN = .61 with a cut-off score of < 11. TH demonstrated equivalent or better overall classification accuracy and sensitivity than most of the other CVLT and CVLT-II variables in both the Psych and MTBI samples. This variable had higher AUC and sensitivity than the Wolfe equation, Immediate Recall Total (1-5), Long Delayed Cued Recall, and Forced Choice Recognition in both subsamples, although all variables were acceptable. TH has comparable AUC and sensitivity to the Sweet et al. (2000) discriminant function for both subsamples, and also comparable with Discriminability in the Psych group (along with higher AUC and sensitivity in the MTBI group).
Conclusions: Results supported TH and the other embedded CVLT PVTs except TFP. This is beneficial since these variables are presumably less susceptible to coaching.
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L.J. RADIGAN, N.M. BILLINGS, L.J. RAPPORT, R.A. HANKS, M.A. LUMLEY & B. BILLINGS. Preliminary Examination of Psychometric Properties for the Multicultural Facial Recognition Test.
Objective: Previous studies have found that people are better at recognizing faces from their own racial group than faces from other races. However, the most widely used tests of facial recognition memory use exclusively White actors for stimuli images. This limitation may disadvantage or distort assessment of individuals from diverse populations. This study shares preliminary psychometric properties of a new Multicultural Facial Recognition Test (MCFR).
Participants and Methods: Fifty-one adults (36 women, ages 18-78 years) who self-identified as either Black, White, Hispanic, Asian, or Native American participated. The MCFR was created to parallel the design of the Warrington Recognition Memory Test (RMT) by selecting a subset of stimuli from the Montreal Set of Facial Displays of Emotion (Beaupré Cheung, & Hess, 2000) of Black (sub-Saharan), White (French Canadian), Hispanic (South American), and Asian (Chinese) actors. These stimuli have been well tested in experimental contexts but have not been applied for clinical use. Participants completed the MCFR, RMT and other cognitive tests. Face validity was examined via participant ratings of the tests.
Results: Performance on the MCFR correlated with the RMT and a test of visual memory (Brief Visual Memory Test), but not with tasks assessing other cognitive domains such as basic attention (Digit Span) or processing speed (Trails A). The effect size for differences between the subset of Black (n = 30) and White (n = 18) participants was small for the MCFR (Hedges' g = 0.2) and medium for the RMT (g = 0.6). Although the MCFR (M = 65% correct) was significantly more difficult than the RMT (M = 73% correct), participants reported favoring the MCFR over the RMT.
Conclusions: Preliminary results suggest that the MCFR demonstrated convergent and discriminant validity as a tool for measuring facial recognition memory in a racially diverse sample. Current difficulty level may be high, but continued research in developing the MCFR for clinical use seems warranted.
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D. RIVERA, N. LANGER, J. GALARZA, W. RODRÍGUEZ IRIZARRY, J. RESTREPO, M. QUIJANO & J.C. ARANGO-LASPRILLA. Predictors of the Rey Osterrieth Complex Figure (ROCF) copy and memory decay scores in Spanish-speaking children and adults.

Objective: Rey Osterrieth Complex Figure (ROCF) copy and memory scores are considered to determine visual memory is impairment. However, memory score may be affected by the copy performance. The goals of this study were 1) to create a memory decay score which takes the copy score into account, 2) to examine predictors of copy and memory decay scores, and 3) to examine predictors of individual items of the ROCF scores.

Participants and Methods: 1432 healthy adults ages 18–95 (mean age: 53.8±19.2 years) and 1032 healthy children aged 6–17 (mean age: 11.3±3.4 years) from Colombia, Mexico, Puerto Rico, and Spain were administered the ROCF. A memory decay score was created which takes the baseline (copy) performance into account: [(delayed recall score– copy score)/copy score]. Four mixed linear models (MLM) (two for adults and two for children) were used to investigate whether demographic variables [age, gender, country of origin and education (parental education for the child model)] predicted copy and memory decay scores. For the item-specific analysis, MLM were computed to examine the influence of the demographic variables on copy and memory decay scores.

Results: The MLM for the adults revealed that copy and memory score was predicted by age and education ($p<.05$). The MLM for the children indicated that copy score was predicted by age ($p<.01$) while memory decay score was predicted by and interaction of age and gender ($p<.05$). The item-specific MLM for adults and children showed that predictors of copy and memory decay scores differed depending on the item.

Conclusions: Memory decay scores gives a visual memory impairment measure deleting cofounding variables influence. Age and education were associated with ROCF copy and memory decay scores. However, different demographic variables differentially influence specific ROCF items.

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D. RIVERA, A. RODRÍGUEZ-LORENZANA, L.A. ADANA, T.P. YACELGA PONCE & J.C. ARANGO-LASPRILLA. Normative Data for Rey–Osterrieth Complex Figure and Hopkins Verbal Learning Test-Revised for Adults from Ecuador.

Objective: To generate normative data for Rey–Osterrieth Complex Figure (ROCF) and Hopkins Verbal Learning Test-Revised (HVLT-R) Test for adults from Ecuador.

Participants and Methods: 204 healthy adults from Ecuador were evaluated. Inclusion criteria were: age between 18 to 70 years, Spanish as native language, had completed at least one year of formal education, able to read and write, and scored ≥23 on the Mini-Mental State Examination. Approximately half of the sample were women (52.8%) with an average age of 33.3±12.5 years and 13.5±4.1 years of education. ROCF Copy and Memory scores and HVLT-R Total recall, Delayed recall, and Recognition scores were normed using multiple linear regressions (MLR) and standard deviation of residual values. Age, age^2, education, education^2, sex, and interactions were included as predictors in the main model. A four step analyses were used to generate norms: 1) the predictive value was obtained using b-values of each model, 2) the residual value was obtained, 3) the residual value was standardized, and 4) tables of percentiles were calculated. For all MLR models, the assumptions for multicollinearity, normality, homoscedasticity, and the existence of influential values.

Results: The five final MLR models showed main effects for education on all scores, such that scores increased linearly as a function of education (p's<.005). Age had a significant effect on ROCF Memory, HVLT-R Total recall, and Delayed recall scores (p's<.005), such that scores decreased linearly as a function of age. The amount of variance explained by MLR models ranged from 3.7% (HVLT-R Recognition) to 15.8% (ROCF memory).

Conclusions: To generate normative data in an adult population from Ecuador, education and age are the most important variables. These norms provide neuropsychologists in Ecuador a more accurate way to interpret ROCF and HVLT-R scores based on age and/or education.

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C. KATZEF, M. HENRY, H. GOUSE, R.N. ROBBINS & K.G. THOMAS. A Culturally Fair Test of Processing Speed: Construct validity and preliminary normative data for South African adults.

Objective: Impaired processing speed (PS) is a feature of cognitive profiles associated with HIV infection and other neurological disorders particularly prevalent in low- or middle-income countries (LMICs). However, standard PS tests are not validated for use in LMICs. We assessed, in a South African sample, the construct validity of PS tests contained within NeuroScreen (a tablet-based application and test battery designed to be culturally fair) and created preliminary normative data for those tests.

Participants and Methods: We administered NeuroScreen and paper-and-pencil neuropsychological tests to 112 healthy adults (56 women, 56 men; age M=35.44±11.83, range=18-64; education M=10.55±1.44, range=2-13) from low socioeconomic status backgrounds.

Results: Factor analyses showed that NeuroScreen PS scores loaded onto (a) a single factor, thus allowing the inference that these variables measure the same cognitive construct, (b) the same factor as scores on paper-and-pencil PS tests, thus demonstrating convergent validity, and (c) a different factor as scores on paper-and-pencil non-PS tests, thus demonstrating divergent validity. Regression analyses indicated that age, but not sex or education, significantly predicted NeuroScreen PS performance (increasing age correlated with slower task completion). The final regression equations formed the bases of demographically corrected preliminary normative data.

Conclusions: This is the first study showing that NeuroScreen allows adequate assessment of adult PS performance in an LMIC setting, and providing locally relevant, appropriately stratified preliminary normative data for NeuroScreen PS tasks. Considering, for example, the significance of PS decline in the trajectory of HIV, and the disease's prevalence in South Africa, potential benefits of NeuroScreen are far-reaching. These benefits are amplified by the fact that the battery is highly suited for use in low-resource clinical contexts (e.g., it is time- and cost-effective and simple enough for lay professionals to administer).

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A. ROSEN, T.M. MOORE, M.E. CALKINS, R.C. GUR & R.E. GUR. Effects of Skip-Logic on the Validity of Dimensional Clinical Scores: A Simulation Study.

Objective: Clinical assessment of psychological phenotypes is a burdensome procedure, largely influenced by the amount of time these interviews require. One method to alleviate this burden is to introduce skip-logic (SL) to these interviews. SL allows for portions of an interview to be skipped if probe items are not endorsed. The bias that SL contributes to the resultant estimates of continuous clinical phenotypes is unknown and can be explored using item response theory.

Participants and Methods: Simulated response data were created while varying 5 key characteristics of the questionnaires. These characteristics include the number of probe items, the "difficulty" or clinical severity of the probes, the difficulty of non-probe items, the shape of the trait (theta) distribution, and the range of discrimination parameters for all items. Across all simulated iterations the number of simulations and simulated examinees were held constant at 2000, and 10,000 respectively. A criterion variable that correlated at .8 with the theta was also created, the outcome of interest was then the difference between

the criterion variable and the estimated score with and without SL. The differences between these parameters was explored using ANOVAs.
Results: Interactions among all 5 variables displayed significance and subsequent interactions were also significant. The largest 2-way interaction was between that of probe difficulty and difficulty of non-probes, such that when probes have low difficulty introduced bias is low regardless of non-probe item difficulty; larger bias is introduced as probe difficultly is increased. This among the other probed interactions suggests that SL can bias the results of estimated phenotypes in manners that are unique to the probes.
Conclusions: Results suggest that probe questions in clinical assessment questionnaires can introduce bias given a culmination of the probes profile. This suggests that IRT should be employed when designing clinical questionnaires.
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E. ROSENICH, B. HORDACRE, M. MCDONNELL & S. HILLIER. Brain and Cognitive Reserve in Healthy and Neurologically Impaired Populations: A Scoping Review of Conceptual and Psychometric Measurement Properties.
Objective: The 'reserve' hypothesis posits that individual differences in brain structure and function allows some individuals to better withstand brain pathology or injury. The aim of this scoping review was to evaluate the conceptual and psychometric properties of tools and methods used to operationalise reserve in healthy and neurologically impaired populations.
Participants and Methods: To satisfy inclusion into the review, all studies had to explicitly claim (a priori) to measure brain and/or cognitive reserve. The populations of interest were healthy adults and those with a disorder or injury of the central nervous system, excluding dementia. A systematic search of EMBASE, MEDLINE, Web of Science, PsycINFO, Scopus and AgeLine resulted in 2,502 hits, with 264 studies included in the review.
Results: Across studies, 86 distinct reserve indicators were identified. The number of indicators used per study ranged from 1 to 12. Education, occupation, verbal/vocabulary intelligence, and complex mental or lifestyle activities were the most commonly used indicators. The majority of studies (62.5%) used a multi-indicator approach to measure reserve. A minority of studies (41.3%) considered the psychometric properties of measures, with the studies that sought to validate multi-indicator reserve questionnaires demonstrating the most rigorous psychometric profiles.
Conclusions: There is a strong need for greater clarity and consensus about the contributors to, and measurement of, reserve. It is recommended that future studies use a multi-indicator tool to assess reserve as they demonstrated the most rigorous psychometric properties and are likely to better capture the complex construct of cognitive reserve.
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A.G. SABELLI, B. TAYLOR, N. RYKULSKI, C. ABEARE & L.A. ERDODI. Demographically Adjusted Cutoffs are Necessary to Protect Against False Positive Errors on the Trail Making Test as a Performance Validity Indicator in Adults with Traumatic Brain Injury.
Objective: The Trail Making Test (TMT) has a long presence in the research literature as an embedded validity indicator (EVI). Until recently, validity cutoffs were only available in raw scores, which have shown sensitivity to the demographic variables of age and education. The present study was designed to investigate the effect of demographic adjustment of validity cutoffs on the TMT as an EVI.
Participants and Methods: Archival data were collected from a sample of 100 adults with TBI (76 of mild severity) consecutively referred for neuropsychological assessment at a Midwestern academic medical center (M_{Age}=37.6; M_{Ed}= 13.5).
Results: Although validity cutoffs based on raw scores and demographically adjusted T-scores produced comparable classification accuracy, patients who failed raw score cutoffs were significantly older (*d*: .47-.84) and less educated (*d*: .39-.52) than those who passed them. However, there were no education- or age-effects on the T-score based cutoffs.
Conclusions: Results suggest that using raw score based validity cutoffs embedded within the TMT increases the risk of false positive errors in older and less educated patients. Given the clinical and forensic implications of systematically misclassifying neurocognitive profiles as *invalid*, there is an imperative for transitioning to validity cutoffs based on demographically adjusted T-scores.
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E.P. SCOTT, A. SORRELL & A. BENITEZ. Psychometric Properties of the NIH Toolbox Cognition Battery in Cognitively Unimpaired Older Adults: Construct Validity, Agreement, and Test-Retest Reliability.
Objective: The NIH Toolbox-Cognition Battery (NIHTB-CB) offers several advantages over traditional neuropsychological tests, prompting growing interest in its use in clinical settings. However, few studies have examined its validity in healthy older adults and no studies have examined its agreement with standard neuropsychological measures of the same constructs. Thus, we aimed to establish the psychometric properties of the NIHTB-CB in older adults by examining its test-retest reliability, agreement with gold standard neuropsychological tests, and associations with medial temporal lobe and ventricular volumes.
Participants and Methods: Sixty-one older adults ages 60-80 completed a neuropsychological test battery (AmNART, Uniform Dataset [Weintraub et al., 2009], Stroop Color-Word Test, Rey AVLT), NIHTB-CB, and brain MRI. A subsample (n= 37) returned for follow-up after 15.3 months. Pearson's correlations, concordance correlation coefficients (CCC), root mean square deviations, and Bland-Altman plots were generated to assess convergent/discriminant validity, reliability, and agreement of age-adjusted scores.
Results: NIHTB Fluid and Crystallized composites showed strong convergent (r's = .58 and .83) and discriminant validity (r's = .31 and .43), test-retest reliability (CCC's = .77and .92), and fair to moderate agreement with validation measures (CCC's = .55 and .72; mean discrepancies > 0.5 SD). The NIHTB-CB Fluid Composite was more strongly associated with medial temporal lobe (r = .41) and ventricular volumes (r's = -.35) than gold standard neuropsychological tests (r's = .26 to -.26, respectively).
Conclusions: These results support the reliability and validity of the NIHTB-CB in cognitively unimpaired older adults, and suggest that these measures may be more sensitive than standard neuropsychological tests to medial temporal atrophy and ventricular expansion. However, these instruments often generate different estimates of performance and should not be treated as interchangeable.
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J. SEELEY MCGEE, J. RYAN, D. KREINER & S. SUMERALL. Frequency of Usage and Clinical Utility of WAIS-IV Process Scores.
Objective: The WAIS-IV introduced eight Process scores derived from Digit Span (forward, backward, sequencing, longest forward, longest backward, longest sequencing), Letter-Number Sequencing (longest sequence), and Block Design (no time bonus). These scores provide information beyond that gleaned from interpretation of the standard subtest scaled scores. The purpose of this survey was to determine the frequency of usage of the new scores as well as practitioners' perceptions of their clinical utility.

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Participants and Methods: A random sample of 150 professional members of NAN was surveyed about their usage and opinions of each Process score. Cover letters and surveys were sent by email in 2017 with two follow up emails to increase the response rate. The survey consisted of 32 Process score questions and six demographic and practice characteristics items.
Results: Approximately 42% of the surveys were completed, but no one answered every question. This resulted in a different response rate for each question. The majority of respondents reported ≥ 10 years of experience and identified as neuropsychologists (see Table 1). Digit Span Process scores of forward, backward, and sequencing were most frequently used (82%; 41/50) followed by scores for longest forward, backward, and sequencing (59.2%; 29/49). Process scores for Block Design (37.9%; 22/58) and Letter-Number Sequencing (20.4%; 10/49) were used far less frequently (Table 2). In terms of clinical utility of the eight scores, Digit Span forward (1.0), backward (2.0), and sequencing (3.5) were most highly ranked, whereas the Block Design (7.0) and Letter-Number Sequencing (8.0) received the lowest rankings. Most respondents were unsure of how to interpret Process score discrepancies (e.g., BD vs. no time BD).
Conclusions: Digit Span Process scores are used more frequently and provide more useful clinical information than do those obtained from Block Design and Letter-Number Sequencing. Research is needed to develop interpretive strategies for the Process scores.
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K.V. SIPPIO, E. SCHULZE & S. STERN. An Examination of Victoria Symptom Validity Test Cutoff Scores in a Heterogenous Clinical Sample.
Objective: The Victoria Symptom Validity Test (VSVT) is a commonly used performance validity test (PVT), though concern has been raised that the classification criteria recommended by the test authors results in unacceptably low sensitivity for detecting suboptimal performance validity. To explore VSVT classification rates on the basis of previously recommended cutoffs (i.e., below chance = invalid, at chance = questionable) and other published recommended cutoff scores (i.e. ≤17 and ≤20); the present study retrospectively examined VSVT performance among a large, heterogeneous clinical sample.
Participants and Methods: Participants were 315 clinically-referred patients who were administered the VSVT during comprehensive clinical neuropsychological evaluation between 2014-2018. Patients referred for forensic evaluations were excluded.
Results: In our relatively young clinical sample (M_{age}=37.74; SD=13.88), VSVT performance was as follows: Total Correct: (M=43.21; SD=6.63), Easy Items Correct (M=23.06; SD=2.37), and Difficult Items Correct (M=20.13; SD=4.99). With regard to specific cutoffs, 12 (3.8%) performed below chance on difficult items, and 43 (13.7%) performed at chance level. In contrast, 71 (22.5%) performed below the recommend cutoff of ≤17 difficult items, and 108 (34.3%) scored below the recommended cutoff of ≤20 difficult items.
Conclusions: These findings suggest that the test author recommended classification criteria function quite differently from other established cutoff scores in our clinical sample. Below chance performance on VSVT difficult items indicative of intentional response distortion was rare, and consistent with other studies. In general the recommended difficult item cutoff scores of ≤17 and ≤20 function similarly in our clinical sample when compared to other published studies of VSVT performance in heterogeneous clinical samples.
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K.L. SULLIVAN, P.A. KULESZ & S.P. WOODS. Psychometrics and Construct Validity of the Survey of Memory-Related Quality of Life in HIV Disease.
Objective: Performance-based deficits in episodic memory are often correlated with lower quality of life (QoL); however, there are no validated measures that directly assess the impact of memory problems on QoL. This study evaluates the psychometrics and construct validity of a newly developed, 30-item questionnaire, entitled the Survey of Memory-Related Quality of Life (SMRQoL).
Participants and Methods: Study participants included 195 HIV+ and 146 HIV- individuals who completed the SMRQoL, a neurocognitive research battery, and validated self-report questionnaires of memory and QoL. Participants were classified into younger (age ≤ 40 years) and older (age ≥ 50 years) groups. A subset of participants returned for a follow-up assessment 14 months after the initial visit.
Results: The SMRQoL had a unidimensional factor structure and demonstrated measurement invariance across the HIV+ and HIV- participants. There was a significant interaction of age and HIV status on the SMRQoL, such that older HIV+ participants reported the lowest memory-related QoL ($ps < .05$). Among the older HIV+ group, lower SMRQoL scores were associated with higher self-reported memory complaints and lower QoL, but not with actual memory performance. Longitudinal analyses of clinically stable participants indicated that the SMRQoL had adequate test-retest stability.
Conclusions: The SMRQoL shows promising preliminary psychometric properties, sensitivity to vulnerable clinical populations, and evidence of convergent validity with measures of memory symptoms and health-related QoL. Future studies are needed to determine the replicability of these findings in other populations with clinically impactful deficits in episodic memory.
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L. TURKELSON. The Relationship Between Evidence Accumulation, Confidence, and Cognition.
Objective: In decision making research, choice deferral is a behavioral manifestation of indecisiveness. The continued need for evidence accumulation is one way individuals justify choice deferral (Bastardi & Shafir, 1998). However, excessive evidence accumulation can be counterproductive. In a study by Rassin, et al. (2007), participants drew straws from a bag to determine if the bag contained 80% red straws and 20% blue straws, or 80% blue and 20% red. Participants with high scores on a measure of self-reported indecisiveness (IDS) drew significantly more straws; however, drawing more straws did not improve their decision accuracy. We developed a computerized version of Rassin's et al. (2007) task and added a modified behavioral measure of confidence (which is often measured by self-report). We also explored how this related to several cognitive constructs.
Participants and Methods: Participants' confidence levels were recorded after each straw draw, as well as the number of times they changed their confidence ratings before drawing the next straw. This enabled us to explore how "confidence about confidence" related to evidence accumulation. Our pilot sample was composed of 39 college students (*Female* = 32%, M_{age} = 19).
Results: The following trends were observed: both scores on the IDS and mean straw draws were strongly related to the number of times participants changed their confidence ratings. Scores on the IDS were not strongly related to average number of straw draws. Lower IDS scores correlated with higher Digit Span scores; WRAT reading scores were inversely related to number of straw draws. Cognitive reflection test scores—i.e. the ability to over-ride "gut level" reactions—were also inversely related to number of straw draws. Evidence accumulation was not influenced by how soon participants saw a minority color straw.
Conclusions: These results suggest certain cognitive proficiencies underlie efficient information processing for decisions. These results are discussed in the context of decision theory.

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B. TYSON, L. CABRERA & E. SCRIVEN. The Diagnostic Utility of the "Attended Alone" Sign for Dementia in Patients Presenting for Neuropsychological Evaluation.

Objective: The diagnostic utility of the "attended alone" sign, defined here as failure to attend a neuropsychological evaluation with an informant, was investigated in a sample of patients presenting for neuropsychological evaluation.

Participants and Methods: Data was gathered through a retrospective review of 275 consecutive patients seen by a neuropsychologist over a 4-year period in the Northwest United States. Participants were said to have "attended alone" if they drove themselves to the appointment, coordinated a bus or taxi ride to the appointment alone, or walked to the appointment alone. Participants were said to have "attended with an informant" if they were accompanied to the clinic by a family, friend, or caretaker. The "attended alone" sign was considered as a measure of dementia and compared with the final DSM-based diagnosis with biomarker evidence where available. Analysis included calculations of test sensitivity, specificity, positive and negative predictive values, diagnostic odds ratio, and positive and negative likelihood ratios.

Results: In this sample of 275 patients, 119 attended with an informant and 156 attended alone. A total of 47 patients were diagnosed with dementia, while 228 were not. In the dementia group, 44 patients attended with an informant and only 3 attended alone. In the non-dementia group, 153 attended alone and 75 attended with an informant. The "attended alone" sign as a diagnostic test for dementia had an accuracy of 0.72, sensitivity of 0.94 and specificity of 0.67. The positive predictive value was only 0.37, though the negative predictive value was very high at 0.98. Positive and negative likelihood ratios were 2.85 and 0.10, respectively.

Conclusions: The "attended alone" sign demonstrated very high sensitivity, which translated to both a very large negative predictive value and a small negative likelihood ratio, indicating a large diagnostic gain. Attending a neuropsychological evaluation alone is an underappreciated, yet very sensitive marker of the *absence* of dementia.

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D. LEITNER, M.R. UDALA, H. MILLER & M. LIBBEN. Criterion Validity of the Selective Reminiding Test.

Objective: The Buschke Selective Reminding Test (SRT; Buschke, 1973) has demonstrated sensitivity in differentiating between stroke locations (Campbell et al., 2017), severity of traumatic brain injury (Leitner et al., 2017), as well as healthy controls and patients with multiple sclerosis (Radomski et al., 2015). Interhemispheric differences in learning and memory have been reported with left hemisphere strokes resulting in worse performance on the SRT (Lezak et al., 2012). The current study investigated the criterion validity of the SRT in an inpatient stroke sample.

Participants and Methods: Sixty-seven patients who incurred a stroke (46 right and 21 left) were recruited from a tertiary hospital. Eight-eight healthy individiuals were recruited form the community to serve as a control group. Participants completed a battery of neuropsychological tests that included the SRT. Total List, LTS, STR, CLTR, RLTR, SDCR, and LDFR scores were included in the analyses.

Results: MANOVA results revealed a significant main effect for Group on a linear combination of the DVs, Pillai's Trace = .58, $F(30, 444) = 3.55$, $p < .001$, $\eta^2 = .19$. Univariate analyses revealed significant group differences on all scores, (all $p$values <.01). After correction, the control group differed significantly from stroke groups on all scores (p<.01). Patients with left hemisphere strokes performed worse on the LDFR than right hemisphere strokes (p= .05). DFA revealed on significant function accounting for 85% of the variance in differentiating group membership. The model correctly classified 65% of overall cases.

Conclusions: Findings supported the use of the SRT as a clinically useful tool in identifying verbal learning and memory impairment in patients recovering from acute stroke; however, differentiating between left and right hemisphere was limited.

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M.R. UDALA, M. UDALA, H. MILLER, D. LEITNER, E.S. WANDINGER, H. GERNAK, A. LEVAY, T. MORRISH & M. LIBBEN. Free Online Scoring Program for the Buschke Selective-Reminding Test.

Objective: The Buschke Selective-Reminding Test (SRT; Buschke, 1973) is a brief assessment of verbal learning and memory including components of encoding, storage, and retrieval. Recently, the SRT has been shown to be more sensitive to detect impairment in a stroke (Leitner et al., 2017) and traumatic brain injury (Campbell et al., 2017) populations in comparison to the California Verbal Learning Test-II (CVLT-II; Delis et al., 2000). The SRT has been validated in a number of different populations (e.g., Zalonis et al., 2009). North American norms are provided by Larrabee et al. (1988). Rabin et al. (2005) reported that the SRT was among the 15 top used verbal memory tests in North America; however, the SRT has fallen out of the top 15 used verbal memory tests in an updated survey (Rabin et al., 2016), despite being a free test in the public domain. The SRT involves a complicated hand scoring method that may influence a practitioner's decision for use. As such, the present study sought to evaluate and validate a free online scoring program for the SRT.

Participants and Methods: A sample of 100 patients in an inpatient rehabilitation program were administered the SRT. Their results were first scored by hand and then by a newly developed, free, online scoring program. The program was created with Java Script and is currently hosted on a free domain name: https://mudala.bitbucket.io/buschke/.

Results: SRT files were first scored by hand and compared to the results from the online scoring program and re-scored to verify the online scoring program to be correct. In the patient files where errors were found, errors were only found when the SRT was scored by hand compared to when it was scored with the online program. In no instance was the online scoring program found to be in error.

Conclusions: Results indicated that the online scoring program for the SRT was able to increase efficiency and eliminate hand scoring errors. As such, this program may make the SRT a more accessible, brief measure of verbal learning and memory.

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A. VINCENT, E. FUENZALIDA, D.J. BRYANT, E. PETERS & M. BENEDA-BENDER. ANAM Mobile Test-Retest Reliability and Practice Effects.

Objective: Computer-based neurocognitive assessments are increasingly transitioning to tablet platforms for their ease of administration and mobile nature. With the transition to a new platform, considerations such as device familiarity, computer-user interface, and response modality, among other factors necessitate reassessment of the psychometric properties of validated neurocognitive tests on new platforms. This study examined test-retest reliability and practice effects for a tablet version of selected tests from the Automated Neuropsychological Assessment Metrics, ANAM Mobile.

Participants and Methods: ANAM Mobile was administered to 108 university students and then repeated in an alternate form at one week. Test-retest reliability, practice effects, and the standard error of measurement were calculated.

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Results: The test-retest reliability intraclass correlations (ICCs) ranged from .55 (Simple Response Time) to .87 (Matching to Sample) for the subtest scores and were consistent with estimates across similar intervals using traditional computer platforms. Small effect sizes for significant practice effects were also observed.
Conclusions: ANAM Mobile has good-to-excellent test-retest reliability across a 7-day retest interval that are consistent with those observed from administrations on traditional computer platforms. Practice effects were small and of the expected magnitude. This study presents initial psychometric data from the tablet version of ANAM and supports its use as a reliable measure of cognition. These data also provide estimates needed to derive reliable change indices to support clinical use. Future research should examine retest reliabilities across other intervals and explore the comparability of individual scores from tablets and traditional PC devices.
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A. VINCENT, E. FUENZALIDA, B. STONE, M. BENEDA-BENDER & E. PETERS. Intercorrelations Between Two Computerized Neurocognitive Assessment Tools: ANAM and ImPACT.
Objective: Despite widespread use of computerized neurocognitive assessment tools, little is known how these test batteries compare. Consequently, this study explored the correlations between two test batteries commonly used to assess cognitive performance following mild traumatic brain injury (mTBI): ANAM and ImPACT. While this does not address the clinical utility of these tests, it does provide information regarding how the tests relate.
Participants and Methods: Data were analyzed from 92 university students (ages 18-24, 77% female) who were administered these measures in counterbalanced order. Pearson correlational analyses were conducted to examine the relationship between ImPACT and ANAM subtest and composite scores.
Results: Significant, but modest, correlations were observed between the ANAM Composite Score and 4 of 5 ImPACT composite scores. The strongest associations were observed with the ImPACT Reaction Time (r = -0.60) and Verbal Memory (r = 0.54) composites. Individual ANAM subtests showed moderate correlations with ImPACT composites. The ImPACT Reaction Time composite was significantly associated with all 8 of the ANAM subtests. Overall, the ANAM Code Substitution – Learning and Procedural Reaction Time tests showed the strongest correlations with ImPACT composite scores. However, no associations were observed for any of the ANAM subtests with the Impulse Control composite. To better understand how ANAM and ImPACT are related, the specific subtests that comprise the ImPACT composite scores were also correlated with the ANAM subtest scores. Correlations ranged between 0.0 and 0.6. Many reached the $p < 0.01$ significance level.
Conclusions: Previous comparative studies have found differential sensitivity and specificity among computer-based tests for the assessment of mTBI. The results of the current study elucidate important distinctions between these batteries and may provide key insights for interpreting these differences.
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S. MOHLER, J. PAULSON, G. ANDREWS & L. VO. Embedded Performance Validity Within the Neuropsychological Assessment Battery (NAB): Reliable Digit Span-NAB (RDS-N).
Objective: Inclusion of performance validity tests (PVTs) is critical in neuropsychological evaluations as a means for objectively measuring optimal effort. Embedded PVTs accompany comprehensive assessment of performance validity and may provide more sensitive inferences about secondary gain. The Reliable Digit Span (RDS) is well-researched for the Wechsler Adult Intelligence Scale – Fourth Edition (WAIS-IV: Wechsler, 2008); however, a dearth of research exists concerning validity of the Neuropsychological Assessment Battery (NAB: Stern & White, 2003) Digit Span subtest. The present study aims to identify an embedded PVT– the Reliable Digit Span-NAB (RDS-N) within the NAB Attention and Screening Modules.
Participants and Methods: The sample consisted of 119 veterans seen in an outpatient clinical neuropsychological setting. The battery included established PVTs (e.g., DCT and TOMM), the NAB Attention and Screening Modules, and other clinical measures. Subjects were classified utilizing the Slick & Sherman criteria (2013); ROC analyses were conducted to evaluate the RDS-N.
Results: RDS-N yielded an AUC of 0.88. Applying the cut score of ≤8 RDS-N resulted in a sensitivity of 0.57 and a specificity of 0.83.
Conclusions: Within this sample, a cut off score of ≤8 RDS-N produced acceptable sensitivity and specificity. The sensitivity may have been impacted by the proportion of veterans with poor effort (n = 18) versus those with adequate effort (n = 101). Nevertheless, this research corresponds with existing RDS measures and proves to be clinically useful.
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D. WEITZNER & M. CALAMIA. Examining Associations of Objective Memory Process Scores and Subjective Cognitive Complaints.
Objective: The association between objective memory performance and subjective cognitive complaints is often found to be small. Studies often utilize widely used memory scores including total learning and total delayed recall. The objective of the current study was to examine the associations between process scores from an objective memory measure and subjective cognitive complaints.
Participants and Methods: Participants included 201 older adults (63.2% female, mean age of 68.5 years (SD = 6.0), range: 56-85 years) enrolled in the Nathan Kline Institute-Rockland Sample (NKI-RS), a publicly available community sample. The Rey Auditory Verbal Learning Test (RAVLT) was used to measure memory performance and the Older Adult Self Report (OASR) memory/cognition subscale was used to measure subjective cognitive complaints. A hierarchical linear regression was conducted including demographic variables, OASR anxious/depressive subscale symptoms, and neuropsychological process scores as predictors of OASR subjective cognitive complaints.
Results: Subjective anxious/depression symptoms on the OASR ($p < .001$) and total repetitions on the RAVLT ($p < .01$) were significantly correlated with subjective cognitive complaints. The relationship of the anxious/depressive symptoms (Beta = .58, $p < .001$) and total repetitions (Beta = .13, $p < .05$) remained significant when controlling for demographic variables (e.g., age, education), total scores (e.g., total learning, delayed recall), and other process scores (e.g., total repetitions, primacy effect).
Conclusions: The results of the current study suggest that total repetitions on the RAVLT is significantly related to subjective cognitive complaints in cognitively healthy individuals. Therefore, the analysis of specific process scores, in addition to analyzing total words recalled on memory measures, may help to more fully assess the relationship between objective memory performance and subjective cognitive complaints.
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L.M. WILLIAMS, B. MORENO, G. HWANG, V.A. NAIR, A. KULKARNI, M. PASQUESI, I. TAYLOR, K.L. YANG, R. MOHANTY, C. COOK, C. RIVERA-BONET, N. TELLAPRAGADA, A. ALEXANDER, O. OKONKWO, S. ASTHANA, R. BIRN, C. CARLSSON, G. CHEN, D. EDWARDS, S. JOHNSON, C. GLEASON, S. KECSKEMETI, S. LI, B. BENDLIN & V. PRABHAKARAN. **The Use of The NIH Toolbox for Cognitive Classification: A Comparison Of the NIH Toolbox and A TraditionalStandardized Neuropsychological Test Battery.**

Objective: The computerizedNIH Toolbox may show utility for cognitive classification in studies of the Alzheimer's clinical syndrome [cognitively unimpaired (CU), mild cognitive impairment (MCI), and Alzheimer's Disease dementia (AD)]. Research suggests that the NIH Toolbox has the potential to replace conventional measures (Buckley et al., 2017). The aim of the current study was to determine whether the computerized NIH Toolbox Cognitive Battery can predict cognitive classification to the same extent as a standardized neuropsychological testing and consensus diagnosis in participants enrolled in the Alzheimer's Disease Connectome Project (ADCP).

Participants and Methods: Participants (N=64) were enrolled in the ADCP and classified as CU (n=42) and MCI/AD (n=22) based on comprehensive evaluation which included the C2 Neuropsychological Battery from the National Alzheimer's Coordinating Center (NACC), and the Clinical Dementia Rating (CDR). Additionally, participants completed the iPad computerized NIH Toolbox Cognitive Battery. A composite score for cognitive performance based on the NIH Toolbox battery was created using principal component analysis. Logic regression analysis was used to determine if the NIH Toolbox was able to classify cognitively impaired from unimpaired participants.

Results: Kaiser-Meyer-Olkin was 0.79, and Bartlett's test was significant (c^2 (62)= 105.052, p<0.00). NIH Toolbox composite model was significantly able to distinguish cognitive impairment from CU performers (c^2 (62)= 3.95, p<0.001). The NIH Toolbox composite classified cognitive impairment and demonstrated a large AUC (95%) with excellent sensitivity (88.37%) and specificity (80.95%).

Conclusions: These findings suggest that the NIH Toolbox has a high potential to classify participants who are cognitively impaired, aligned with standardized measures. The small sample size is a limitation. Overall, more research is required to compare computerized batteries to traditional batteries.

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M. YATES. Development of a Performance Validity Test (PVT) for The General Assessment Questionnaire – Revised (GAQ-R) within a Military Population: A pilot Study.

Objective: Neuropsychologists often employ personality/emotional processing tests as part of a comprehensive evaluation of one's functioning within a neuropsychological assessment. The

General Assessment Questionnaire-Revised (GAQ-R), a Five-Factor model of personality functioning has demonstrated robust psychometric properties (i.e., statistical reliability and validity of measured constructs) within the general population, which is a requisite of any reputable psychological instrument. To date, however, no research has been done with respect to performance validity testing (PVT) of the GAQ-R to ensure a given administration of the instrument is an accurate reflection of the individual's effort to the response set. This exploratory pilot study gathered data on the GAQ-R in active duty military settings and examined two rationally developed PVTs (i.e., GAQ-R Recognition Task; GAQ-R-RT & GAQ-R Forced Choice; GAQ-R-FCT) as well as one commonly used PVT (i.e., Advanced Clinical Solutions - Word Choice). The goal of the study was to explore mean differences, if any, between a military sample and the general population among the five factors of the GAQ-R and to evaluate the utility of the GAQ-R-RT and the GAQ-R-FCT as PVTs.

Participants and Methods: The group differences were explored amongst the general military population (i.e., no known neurological or psychological disorder; N=30) and healthy simulators (i.e., otherwise military personnel who are instructed to feign mild traumatic brain injury N = 30 (mTBI) on the performance across the three PVTs.

Results: Results suggest the simulator group significantly differed on internal consistency and mean performance on the GAQ-R. Too, the simulators performed significantly worse on the GAQ-R-FCT and ACS-Word Choice when compared to healthy controls.

Conclusions: In contrast, the two groups did not differ on the GAQ-R-RT suggesting either a larger sample is needed or the measure is not sufficient to measure effort on a given administration of the GAQ-R.

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B. YOCHIM, M. MADORE & K. FAIRCHILD. Verbal Naming Test: Test-Retest Reliability, Convergent Validity, and Age-Adjusted Normative Data for Veterans Age 60 to 89 Years-Old.

Objective: The Verbal Naming Test (VNT) assesses word-finding ability, or naming, through the use of a naming-to-definition paradigm and has been shown to effectively detect naming deficits in older adults. This study evaluated the test-retest reliability and convergent validity of the measure, and presents normative data from a sample of Veterans stratified by three levels of age (60-69, 70-79, 80-89).

Participants and Methods: The sample included 130 healthy older Veterans who were found to be cognitively intact and free of neurological and acute psychiatric disorders, with a mean age of 75 (SD = 6.83), ranging from 58 to 88. Convergent validity of the VNT and the Boston Naming Test (BNT) was explored by correlating scores on these measures with the Judgment of Line Orientation, Rey Auditory Verbal Learning Test (RAVLT), WMS-IV Logical Memory tests, and Trail Making Test.

Results: Test-retest reliability over 6 to 8 weeks was adequate, r (35) = .77, p < .01. The VNT had medium correlations with Trail Making part B, Logical Memory 1, and Logical Memory 2, and a small/medium correlation with RAVLT Delayed Recall. The BNT had a medium correlation with Judgment of Line Orientation but did not correlate significantly with the other measures. The VNT and BNT did not correlate, r (62) = .10, p = .46. Neither the VNT nor the BNT correlated with education. Age correlated with VNT performance, r (127) = -.26, p < .01. Normative data from 120 males and 4 females were generated and stratified by age.

Conclusions: This study provides normative data on the Verbal Naming Test that can be used in the neuropsychological assessment of older adults. The test was found to have adequate test-retest reliability. Scores on the VNT correlated significantly with measures of verbal memory and a measure of executive functioning, but not with visuospatial ability. Future research will seek to obtain normative data from a more gender-balanced and ethnically diverse sample.

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Assessment/Psychometrics/Methods (Child)

S. ALI, S. MACOUN, D. HALLIDAY, S. MACDONALD, A.Y. KIM & M. KRAUSS. Comparing Operationalizations of Intraindividual Variability in a Child Population: Eenie, Meenie, Miney, but Maybe not Mo.

Objective: Intraindividual variability (IIV) refers to within-person variability, typically indexed across multiple response latency trials of a single reaction time (RT) task and testing occasion. IIV has unique predictability beyond central tendency measures and is associated with

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cognitive/neural integrity across the lifespan. IIV has been operationalized using various metrics to circumvent mean confounds (slower RTs linked to greater variability) and associated artefactual interpretations, yet it is unclear which IIV metric is superior. Stawski *et al.* (2017) investigated five IIV metrics in an older adult sample and noted that four were comparable while one, intraindividual coefficient of variation (ICV), was weaker in its associations. The current study investigated this finding in a child population.

Participants and Methods: 95 children (6-13 years), ranging from those with no attention problems to ADHD, completed a cognitive battery that included sustained attention and inhibitory control tasks. Four IIV metrics were calculated, varying in approach for controlling mean confounds, using RTs from the inhibitory control task: raw intraindividual standard deviation (ISD), ICV, residualized ISD, and Tau (derived from fitting an explicit ex-Gaussian function).

Results: All metrics were highly correlated with each other (r=0.86 to 0.99; $p<0.001$), and moderately correlated with omission errors (r=0.44 to 0.56; $p<0.001$). ICV exhibited the lowest correlation with the other metrics and omission errors. In independent models, all metrics accounted for significant variance in omission errors (19% to 31%), with ICV accounting for the least.

Conclusions: All estimates of IIV were highly correlated and accounted for significant variance in sustained attention. Like Stawski *et al.* (2017), no estimate stood out as superior, though ICV showed the weakest correlations with other IIV metrics and the poorest criterion validity. Limitations and benefits of IIV metrics will be discussed, along with clinical utility/feasibility.

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A.N. BARTLETT, J.E. CASEY, E. O'CONNOR DERIKOZIS & M. HUHTALA. The Association Between Sentence Repetition and Other Cognitive Abilities in School-Aged Children.

Objective: Although sentence repetition (SR) tasks are commonly used in child neuropsychological assessment batteries, the cognitive abilities associated with performance are not well understood. SR has historically been conceptualized as a measure of learning and memory (Baron, 2018), but empirical research indicates that children's SR performance is related to language (Klem et al., 2015), auditory verbal memory (Nag et al., 2017), and processing speed (Poll et al., 2013). A methodological limitation of these studies is that none has examined these cognitive domains together. The present study sought to determine the extent to which language, auditory verbal working memory, processing speed, and nonverbal cognitive ability predict children's SR.

Participants and Methods: Children aged 6 to 14 years (N = 117; 60% female) recruited from schools in southwestern Ontario completed Benton's Sentence Memory Test (1965) and five WISC-V subtests: Vocabulary, Visual Puzzles, Figure Weights, Digit Span, and Coding.

Results: The multiple linear regression model including all independent variables significantly predicted SR performance, $F(5,111) = 18.89$, $p < .001$, *adj.* $R^2 = .44$. Vocabulary and Digit Span significantly added to the prediction, $p < .001$, whereas Figure Weights, Visual Puzzles, and Coding did not. The percentages of variance accounted for by each variable were as follows: Digit Span (20.75%), Vocabulary (17.84%), Figure Weights (1.83%), Visual Puzzles (1.65%), Coding (0.87%).

Conclusions: With the advantage of including cognitive domains identified in previous studies within a single study, the findings support that SR is more than a measure of learning and memory. That SR taps multiple cognitive domains emphasizes the need to consider performance in the context of a comprehensive neuropsychological evaluation.

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M. BERSHAD, A. MILLER, J. LANE, K. ANDREW, D. WOLK & D. MECHANIC-HAMILTON. Pilot mCAPP Study: Early Detection of AD-Related Cognitive Change with the Mobile Cognitive App Performance Program (mCAPP).

Objective: This pilot study investigated the feasibility and preliminary psychometric properties of a mobile app-based memory task (mCAPP) that targets memory changes associated with preclinical Alzheimer's Disease.

Participants and Methods: Participants included 21 older adults (56% female; age=70±3.8, years of education=16±2.8; 67% Caucasian) with normal cognition who are participants in the Penn Alzheimer's Disease Center Cohort. The mCAPP memory task includes learning and then matching hidden card pairs and incorporates increasing memory load, pattern separation features (lure vs. non-lure), and spatial memory (moving target cards). Participants played the mCAPP memory game in-clinic for an average of 28 minutes. Participants recently completed the NACC UDS3 neuropsychological battery.

Results: Almost all participants found the difficulty level of the mCAPP "just right" (89%) and 44% reported they would play it for fun. Participants who reached high levels (higher memory load) on the mCAPP scored higher on the encoding and recall trials of the Craft Story [Craft Story Immediate Recall: t(19)=-3.1, p=0.006; Craft Story Delayed Recall: t(19)=-3.5, p=0.002]. MoCA scores were similar for both groups. Consistent with the increased difficulty associated with pattern separation, the number of guesses on object-lure vs. non-lure levels showed a significant difference, with more guesses required for the lure levels [t(20) = 6.1, p < 0.001]. Additionally, the card level completion speed on the mCAPP correlated significantly with completion speed on the Trail Making Test A (r = 0.73, p = <0.001).

Conclusions: In this pilot study, we show feasibility, convergent and discriminant validity, and utility of multiple memory components of the mCAPP memory task for use in detecting subtle cognitive differences that are associated with preclinical AD. Future work will include examination of the relationship between medial temporal lobe structures and mCAPP performance.

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A. CONNERY, A.M. COLBERT, S. HERNANDEZ, D. BAUER, P. ARROYAVE, H. EL SAHLY, A. PANIAGUA-AVILA, M. LAMB, D. OLSON, E. ASTURIAS & F. MUNOZ. Receptive Language Skills Among Young Children in Rural Guatemala: The Relationship Between Performance on the Test de Vocabulario en Imagenes Peabody (TVIP) and a Translated and Adapted Version of the Mullen Scales of Early Learning (MSEL).

Objective: Limited culturally and linguistically appropriate assessment measures are available in low and lower middle-income countries, especially for young children. Here we examine the association between the Test de Vocabulario en Imagenes Peabody (TVIP; Dunn et al., 1986), a test widely used in Latin America to measure receptive language, and the Mullen Scales of Early Learning receptive language subtest (MSEL-RL; Mullen, 1995) translated into Spanish and adapted for use in rural Guatemala.

Participants and Methods: Participants were children in rural Guatemala (n=56;M age=52 months, *Range*=42-65 months) who were administered the TVIP and adapted MSEL in the context of an observational study on neurodevelopmental outcomes of Zika infection. Sixteen children (28%) failed TVIP practice items and testing was discontinued. Children who failed TVIP practice items were assigned the lowest TVIP standard score for mean group age. Correlational analysis examined the relationship between the MSEL-RL and TVIP. A t-test compared MSEL-RL means between children who passed or failed TVIP practice items.

Results: Performance on the TVIP was significantly, positively correlated with performance on the MSEL-RL (r=0.48, $p<0.001$). Children who passed TVIP practice items performed significantly better

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on the MSEL-RL (M=31) than those who failed TVIP practice items (M=24;p<0.001; d=0.91).
Conclusions: While the TVIP and MSEL-RL measure different aspects of receptive language, preliminary analyses suggest the results from the two tests are significantly correlated. Overall, receptive language performance of this group of children was consistent with that reported in rural areas of other lower middle-income Latin American countries (Schady et al., 2015). Future work should focus on improving population access to appropriate developmental assessments and norms, with the ultimate goal of developing and expanding local preventative and therapeutic intervention programs.
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N. FROST, A.M. O'BRIEN, A.N. BARTLETT & J.E. CASEY. Comparing Performance on the Paper and Digital Formats of WISC-V Coding.
Objective: Unlike previous versions of the Wechsler Intelligence Scale for Children (WISC), two administration formats were developed for the WISC-V – the traditional paper-and-pencil format and a new digital tablet format that includes substantive changes to Coding subtest response style. The paper format requires children to write symbols with a pencil, drawing on graphomotor skills, whereas the tablet format simply requires children to touch a symbol from an array. Three pilot studies conducted by the publisher demonstrated equivalence of these formats (Raiford et al., 2016), supporting the use of the normative and psychometric data gathered on the paper format. No independent study has examined the digital format. The purpose of the present study was to examine the equivalence of the paper and digital formats of the Coding subtest in an independent community sample.
Participants and Methods: Archival data was analyzed from two studies involving community samples of children aged 6-14 years (62% female). Participants were administered select subtests of the WISC-V, including Coding. Some were administered the subtests in paper format (n = 117), whereas others were administered the digital format (n = 96).
Results: Participants that were administered the digital format had significantly greater scaled scores (M = 12.81, SD = 2.91) than those who were administered the paper format (M = 9.50, SD = 2.96) when controlling for age, gender, and presence of a psychological disorder, F (5, 208) = 67.43, p < 0.001.
Conclusions: Results suggest that the two formats of Coding appear to be measuring different abilities, with only the paper version including a graphomotor component. Separate normative data is recommended for the digital format.
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J. GREENE, M. MESSER & S. TRUJILLO. Base Rates, Profile Analysis, and Interrater Discrepancies for the Behavior Rating Inventory of Executive Function – Preschool Version (BRIEF-P).
Objective: Parent and teacher interrater ratings on the BRIEF-P were analyzed, along with additional clinical data collected since the publication of the BRIEF-P, to provide additional statistical evidence to support score interpretation.
Participants and Methods: Base rates of elevated scale T scores were calculated for the BRIEF-P standardization samples and various clinical samples including attention-deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), speech-language impairment (SLI), Down syndrome (DS), and preterm birth. Profiles of elevated scale T scores were also analyzed for the clinical groups. Interrater reliabilities and base rates of T score differences were examined for the BRIEF-P standardization interrater sample.
Results: Parents and teachers rated 9-11% of typically developing children as having an elevated Global Executive Composite (T score ≥ 65). This compares to 70% of children with ADHD, 51-81% of children with ASD, 27-42% of children with a TBI, and 42-53% of children with DS. The correlations between parent and teacher BRIEF-P ratings were low to moderate. The mean differences between scores were very small, with effect sizes ranging from 0.05 to 0.10. Approximately 58-64% of parents and teachers reported scores within 10 T-score points, with only 9-15% being discrepant by more than 20 T-score points. Analysis of profiles of elevated scores across clinical groups revealed that the Working Memory scale was most often in the clinically elevated range.
Conclusions: Examining base rates, T-score profiles, and interrater discrepancies provides statistical evidence which allows a deeper level of interpretation of the BRIEF-P. In particular, we advocate for the use of multiple perspectives when evaluating executive function in young children.
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D. HERNÁNDEZ TORRES. Executive Functions and Social Cognition in School-Aged Children with ADHD: an Assessment Proposal.
Objective: The aim of this study was to develop a computerized neuropsychological battery, named *'EFECS'* (For its spanish acronym: Evaluación de las Funciones Ejecutivas y Cognición Social), which consists of 12 subtests based on the main reported deficits in children with Attention Deficit and Hiperactivity Disorder (ADHD) in the next domains of executive functions and social cognition: sustained attention, inhibitory control, planning, working memory, cognitive flexibility, temporal processing, processing speed, theory of mind, emotion recognition in faces and pragmatic language.
Participants and Methods: *'EFECS'* was applied on a sample of 30 clinically healthy children (17 girls and 13 boys) between 6 to 11 years old (right-handed), students of a public elementary school at Mexico City, with the aim to get an acceptable reliability previous to its aplication with clinical population.
Results: Internal consistency was assessed using Cronbach's alpha which resulted in a good estimate of content consistency (α = .810) for the subtests with partial credit response (0, 1, 2, 3). For subtests with time measures, total hits and total errors, age profiles were obtained based on their respective percentiles.
Conclusions: The different tasks proposed in *'EFECS'* cover the assessment of executive functions and social cognition, reported as deficient in children with ADHD, thus we expect after the validation and standardization processes on a clinical and bigger sample, have a helpful tool for the diagnosis and research.
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A. JANSARI, C. LEPAK, D. PAFETT, A. LLYON-LEE & R.A. CHARLTON. It's my party! A new ecologically-valid virtual reality assessment of executive functions in adolescents.
Objective: Childhood and particularly adolescence are times of enormous neural development so Acquired Brain Injury (ABI) during this period can have severe impacts on everyday life. Particular difficulties can be found in Executive Functions (EFs) but current assessments are limited in their sensitivity. We evaluated the feasibility of a new ecologically-valid test, the Jansari assessment of Executive Functions for Adolescents (JEF-A©) comparing two groups of adolescent children.
Participants and Methods: JEF-A© uses non-immersive virtual reality and resembles a computer game in which the participant has to organise and run their own party multitasking a number of competing concurrent demands. It mimics aspects of the Multiple Errands Task and performance is evaluated on eight subtasks designed to test constructs central to EFs: Planning, Prioritisation, Selective-Thinking, Creative-Thinking, Adaptive-Thinking, Action-Based Prospective Memory (ABPM), Event-Based PM (EBPM) and Time-Based PM (EBPM). Twenty-nine younger

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children (11-13yrs) were compared to 56 WISC-IQ matched older adolescents (16-18yrs) on JEF-A© as well as the FAS and Trails subtests of the DKEFS.
Results: We found significant differences between the groups for both age ($F(1,79)=3.9$, $p<.001$; $\eta_p^2=.28$) and gender ($F(1,79)=1.99$, $p=0.058$, $\eta_p^2=.17$). Further, there were differences between the two age groups for six of the eight constructs (Planning, Prioritisation, Selective-Thinking, Adaptive-Thinking, EBPM and TBPM: all $ps<0.05$). Finally, results demonstrated that only three out of eight of the DKEFS measures discriminated between the age groups.
Conclusions: Our findings demonstrate that JEF-A© is a feasible and playful complex task, allowing a thorough assessment of adolescents' performance in a multitasking situation. It has good discriminant validity and good construct validity relative to the DKEFS. Further research is needed to establish whether JEF-A© can be used as a standard tool for assessing EFs during adolescence.
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R.K. LAW, K. LOWERY & A. DYE. Performance Validity Testing in Adolescent Assessment: Can we Detect Poor Effort?
Objective: Recently, there has been growing use of Performance Validity Tests (PVTs) in neuropsychological assessment of children and adolescents to accurately detect malingering, feigning, and non-credible effort from true disability. Until recently, it was believed that children were not like adults in terms of deception and estimates of effort were largely reliant on clinical judgment and lacked objective data for decision making.
Participants and Methods: This study focused on the ability to utilize the embedded validity measure within cognitive tests, including the Wechsler Intelligence Scales for Children, 5th Edition (WISC-V) and the Wechsler Adult Intelligence Scales, 4th Edition (WAIS-IV). Specifically, this study will look at the embedded performance validity test, Reliable Digit Span (RDS), in comparison to the scores received on Medical Symptom Validity Test (MSVT) and/or the Test of Memory Malingering (TOMM). Data was analyzed to evaluate the sensitivity and specificity of the RDS compared with stand-alone PVTs.
Results: Of the 66 participants (60.6% male, 39.4% female), the mean age was 16.58 with a range of 10 to 22 years old. Approximately 26% of the participants failed the TOMM/MSVT indicating noncredible effort, while no participants failed the RDS (cutoff score: 5). Results indicated no strong correlation between scores on the TOMM/MSVT and the RDS embedded performace of the WAIS-IV/WISC-V. Of note, the performance on the RDS of those who failed the TOMM/MSVT was not significantly different from those who passed.
Conclusions: Implications for the results of this study indicate that the embedded RDS scale appears not to be as sensitive to poor effort as the stand alone PVT measures utilized in this study, the TOMM/MSVT. This supports the current trend in neuropsychology of including PVTs in assessment to evaluate feigning. The current results indicate the need for a larger sample size to determine statistically whether or not the RDS is a reliable measure given the small sample size provided in this study.
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A.J. LEVAN, M.D. SADY, C. GREGORY, R. BRENOWITZ, B. MULLINS-HUSSAIN & G.A. GIOIA. Monitoring Post-Concussion Exertional Effects: Examining Reliable Change for the Children's Exertional Effects Rating Scale (ChEERS).
Objective: To generate reliable change indices on the Children's Exertional Effects Rating Scale (ChEERS) for use in post-concussion management.
Participants and Methods: Participants were 1787 uninjured youth (5-18, M age=12.87; SD=2.53; 84% male). Exertional ratings on the 10-point ChEERS were collected pre- and post-exertion with intervening cognitive testing of approximately 30-40 minutes duration. 1602 youth completed the 5-symptom version of the ChEERS (headache, fatigue, troubles concentrating, irritability) and 185 youths completed the 6-symptom version (included fogginess, light sensitivity, removed dizziness) version. The Exertional Effects Index (EEI) was calculated as a Post-Pre rating difference score, with negative scores set to zero. Pre-injury diagnoses were collected (prior concussions, migraine, anxiety, depression, ADHD, learning disabilities). Means, standard deviations and test-retest reliabilities were generated to produce reliable change indices (RCI) at the 80%, 90% confidence intervals.
Results: No significant differences in EEI scores were found for age, sex and premorbid diagnoses. EEI scores generated with the 5-symptom and 6-symptom versions did not differ. As a result, a single RCI table was generated for the individual symptoms (80% Confidence Interval = 1-2 point difference) and composite (80% CI 5-symptom=5, 6-symptom=4) EEIs.
Conclusions: This study is an extension of Sady et al. (2018), examining exertional effects of seven symptoms in children post-concussion. Using these RCIs, clinicians can quantify clinically meaningful exertional effects (symptom exacerbation) in children and adolescents, which can factor into a more effective treatment plan.
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J. LICHTENSTEIN, A. SCHMID, A. COLE, H. NISSIRIOS & F. BALDWIN. No More Nooses: Replacing the Boston Naming Test in Pediatric Neuropsychological Assessment.
Objective: The Boston Naming Test (BNT) is a confrontation naming test developed for aphasic adults. Despite efforts to develop norms in pediatric populations, many BNT items are inappropriate for children in both content and presentation. There is a need for a pediatric test of confrontation naming to replace the BNT. We hypothesized that performance on the Children's Visual Naming Test (VNT; Hamberger et al., 2017) and the Children's Auditory Naming Test (ANT; Hamberger et al., 2017) would be significantly related to BNT performance, and that the BNT may be related to different cognitive constructs than the ANT and VNT.
Participants and Methods: The data of 41 children referred for outpatient neuropsychological evaluation at an academic medical center was retrospectively analyzed. The sample was 44% female, and ages ranged from 7 to 15 years (M= 10.9, SD= 2.64). Correlation and multiple regression analyses examined relationships between BNT, VNT, ANT, and the following cognitive constructs: overall intelligence (FSIQ), processing speed (PS), and working memory (WM).
Results: Bivariate correlations revealed significant positive associations between BNT and VNT (r= 61, p=.00) and ANT (r=.66, p=.00). Within multiple regression analyses, FSIQ significantly predicted BNT performance (β=.69, p=.00), but not VNT or ANT scores. PS emerged as a significant predictor for the VNT (β=.51, p=.01), but not ANT or BNT. WM was non-significant in all models.
Conclusions: These results support our hypothesis of a significant association between the BNT, VNT, and ANT. While these tests all appear to measure a similar construct, BNT performance is strongly related to FSIQ, while the other tasks were not. This suggests that in a pediatric mixed clinical sample, BNT may be confounded with FSIQ, calling into question its validity as a naming task for kids. Further research with larger sample sizes is needed. For now, the VNT and ANT may be promising suitors to replace the antiquated BNT in pediatric neuropsychological assessment.
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J. LICHTENSTEIN & A. SCHMID. Is That a Tip on Your Tongue? Phonemic Cueing and Age on the Boston Naming Test in Children.
Objective: The Boston Naming Test (BNT) is a widely used neuropsychological assessment tool to measure confrontation naming. Few attempts have been made to quantify the benefit of phonemic cueing in normative or clinical pediatric samples. Although clinicians may qualitatively describe the effects of phonemic cueing in their reports, it is challenging to determine the empirical significance. The aim of this study was to characterize BNT phonemic cueing performance across age groups in a pediatric mixed clinical sample.
Participants and Methods: Retrospective analyses were conducted on 351 children seen for outpatient neuropsychological evaluation at an academic medical center. The sample was 43% female and ranged from 6 to 19 years of age (M=13.35, SD=3.13). Frequencies and descriptive statistics were used to characterize performance. Correlation analyses explored relationships between BNT performance, age, sex, and cognitive factors.
Results: Phonemic cues given followed a fairly normal distribution (M=11.67, SD=5.38). The number of correct responses following phonemic cue delivery was lower (M=3.41, SD=2.18), and the distribution was positively skewed. 53% of the sample improved by 0-3 points, while the remainder improved by 4+ points. Improvement from cueing was not impacted by age, sex, or overall intelligence. Benefit from cueing was not associated with verbal knowledge variables, such as vocabulary or verbal fluency.
Conclusions: Phonemic cues were provided at a higher frequency than has been previously reported in the literature. Nearly half of this clinical sample improved their performance by 4 or more points with cueing. Such information will be useful to clinicians characterizing the magnitude of benefit cueing provides their patients on the BNT. Further research should examine the benefits of cueing within various diagnostic groups. This study provides the first examination into age-stratified phonemic cueing performance in a clinical sample, while providing means and standard deviations for clinicians' reference.
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E.A. MCLEAN, H. WALCOE, J. LENT & P. OHR. Diagnostic Utility of Wechsler Intelligence Scale for Children-V (WISC-V) Indexes in Differentiating Children With and Without Attention Deficit Hyperactivity Disorder (ADHD) Symptomatology.
Objective: Children with ADHD have been found to display weaknesses on cognitive tasks assessing executive functioning. However, there are inconsistencies within the current literature. Changes made from the WISC-IV to the WISC-V warrant investigation. The objective of the present study was to examine WISC-V profiles in children with ADHD symptomatology in comparison to typically developing children.
Participants and Methods: Participants consisted of 49 children presenting with (n=22) and without (n=27) ADHD symptomatology. Groups were comparable for gender, age, and grade with total participant means of 11.49 (*SD* = 2.84) for age and 6.27 (*SD* = 2.89) for grade, with 51% of all participants male. WISC-V scores and Conner's scores were collected from patient files of children and their parents.
Results: Nine independent t-tests were conducted to determine index score differences. Contrary to expectations, groups did not differ for Working Memory ($t(47)$= -.71, p=.48), Processing Speed ($t(47)$= -.56, p=.58), or Cognitive Proficiency ($t(47)$= -.66, p=.51). Additional analyses yielded non-significant results for the Full Scale IQ ($t(47)$= -.75, p=.455) as well as several indexes including Verbal Comprehension ($t(47)$= -1.55, p= .13), Visual Spatial ($t(47)$= -1.28, p=.21), Fluid Reasoning ($t(47)$= .43, p=.673), General Abilities ($t(47)$= -.65, p=.52), and Nonverbal($t(47)$= -1.01, p=.319). Index scores for both groups were within the WISC-V average range.
Conclusions: Our findings differ from current literature in that children in the current study with ADHD symptomatology did not display poorer performance on WISC-V. Changes between WISC-IV and WISC-V may have contributed to the discrepant findings. The results are consistent with several WISC-IV studies that have questioned the ability of indexes to differentiate. This study explored group differences utilizing the newly revised WISC-V, further research is needed to examine diagnostic utility of index scores for children with ADHD symptomatology.
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S. MEZA-CAVAZOS, C. ABARCA-ELIZONDO, F. GUERRERO-FELIX, D. MEZA-VALLE, V. TIRADO-RAMIREZ, D. SOTO-MAGAÑA & A. LOPEZ-SALAZAR. Verbal and Visual Memory on a Group of Gifted Children.
Objective: The objective of this study was to analyze the cognitive performance of gifted children to create accurate programs and establish measurable goals. Visual and verbal memory are prominent cognitive processes in this population. Therefore, it is important to know how this processes work.
Participants and Methods: The sample included 21 subjects selected in two phases. In a first phase, a clinical questionnaire was applied to parents and teachers to identify the main characteristics of gifted children. In the second phase, those who met the selection criteria were evaluated with the WISC-IV. The groups were made with those children with an IQ greater than 130. To evaluate the verbal memory the FCSRT was applied and for the visual memory the ROCF was used. The participants were 80% male and 20% female, with an average age of 11.72 (±3.1) years.
Results: FCSRT scores were high in the 3 free immediate memory trials, with an ascending learning curve (T1 = 9.4 ±2.6, T2 = 11.4 ±2.7 and T3 = 12.5 ±2.8) and in free delayed recall trail (11.8 ±2.6). In the ROCF, the performance was not significantly high, with an average score of 33.3 (±3.6) in the copy task and 22.2 (±7.5) in the delayed recall.
Conclusions: Gifted children perform better on tasks involving verbal memory than visual memory. Therefore, the cognitive training program should include more visual memory activities and corroborate the increase in performance with a subsequent comparative assessment.
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Objective: The objective of this study was to analyze the cognitive performance of gifted children to create accurate programs and establish measurable goals. It is important to know how executive functions work in this population to understand which strategies are used in their daily activities.
Participants and Methods: The sample included 21 subjects selected in two phases. In a first phase, a clinical questionnaire was applied to parents and teachers to identify the main characteristics of gifted children. In the second phase, those who met the selection criteria were evaluated with the WISC-IV. The groups were made with those children with an IQ greater than 130. To evaluate the executive functions the WCST-64, PASAT and STROOP were used. The participants were 80% male and 20% female, with an average age of 11.72 (±3.1) years.
Results: WCST average scores were obtained (correct responses = 42.1 (±13.9), categories completed = 3.3 (±1.1), incorrect responses = 14.8 (±10.9) and perseverative responses = 10.6 (±5.7)). PASAT average scores were calculated (3 seconds version / correct responses = 38.3 (±16.2) and 2 seconds version / correct responses = 32.9 (±15.7)). STROOP average scores were obtained (reading correct responses = 87.6

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(±19.3), naming colors correct responses = 61.5 (±15.2) and interference correct responses = 42.5 (±12.2)).
Conclusions: The categories completed in the WCST are not significantly higher compared to the normal population of the same age and years of schooling. The performance in the PASAT is comparable with subjects of greater age and schooling. The interference control in the sample is similar to that of other normative studies where the average age is over 50 years. It is important to conduct a comparative study after a training program that includes activities of cognitive flexibility, divided attention and interference control.
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S. MEZA-CAVAZOS, C. ABARCA-ELIZONDO, D. MEZA-VALLE, F. GUERRERO-FELIX, V. TIRADO-RAMIREZ, D. SOTO-MAGAÑA & A. LOPEZ-SALAZAR. Attention Tasks on a Group of Gifted Children.
Objective: The objective of this study was to analyze the cognitive performance of gifted children to create accurate programs and establish measurable goals. Attention dysfunction is common in this population. Therefore, it is important to know the performance in attentional tasks.
Participants and Methods: The sample included 21 subjects selected in two phases. In a first phase, a clinical questionnaire was applied to parents and teachers to identify the main characteristics of gifted children. In the second phase, those who met the selection criteria were evaluated with the WISC-IV. The groups were made with those children with an IQ greater than 130. Trail Making Tests (A and B versions) were used to evaluate the processing speed and the alternating attention. The participants were 80% male and 20% female, with an average age of 15 years.
Results: TMT-A average score was 48.6 seconds (±40.5) and TMT-B average score was 88.7 seconds (±63.7). Compared to other normative studies, the scores obtained are equivalent to the performance of adults between 50 and 56 years of age.
Conclusions: Given that the standard deviation is very high, we can conclude that it is not possible to establish an average performance in attentional tasks in gifted children. It will be interesting to expand the sample and replicate psychometric measures.
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F. MORASSE, E. VERA-ESTAY & M. BEAUCHAMP. Assessment of Social Cognition: Using Virtual Reality to Evaluate Adolescent Moral Reasoning.
Objective: The Socio-Moral Aptitude Level task (So-Moral) is a computer-based tool that assesses moral reasoning (MR) using visual vignettes depicting everyday social dilemmas with a moral component (Chiasson et al., 2017). Despite its clinical sensitivity and ecological value, studies using the task have failed to replicate the known association between empathy and MR (Hoffman, 2016). Virtual reality (VR) has the potential to increase ecological value and task effectiveness by providing experimental conditions that are similar to those in a real-world environment. Thus, combining the So-Moral with VR may be optimal because VR allows participants to feel, think and behave as they would in physical reality. The aim of this project was to explore the potential benefits of using VR in the assessment of MR. It was expected that the So-Moral-VR task would produce similar MR levels as the original task but enhance task effectiveness.
Participants and Methods: 30 participants between 12 and 25 years completed both versions of the So-Moral task and an empathy questionnaire. Participants were presented with moral dilemmas and were asked to explain how they would react and why, if they were in that situation. Moral maturity (MM) was assessed for each dilemma based on a five-level scale. Empathy was assessed with the Interpersonal Reactivity Index (affective scale). Paired sample *t*-tests were used to compare MM between both versions of the task and correlations were used to explore the association between empathy and MM.
Results: Both versions of the So-Moral were correlated (r=.52, p=.005) and no significant difference was found on MM (t=1.5, p=.16). An association was found between empathy and MM (r=.46, p=.01) in the VR version, but not in the original version (r=.07, p=.73).
Conclusions: These results suggest that the VR version of the So-Moral provides similar results as the computer one, but allows greater task effectiveness, thus providing a more reliable measure of MR with a more ecological and dynamic mode of assessment.
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I.M. PACHECO-COLON, S.W. HAWES, J.C. DUPERROUZEL, C. LOPEZ-QUINTERO & R. GONZALEZ. Assessing Measurement Invariance of a Latent Decision-Making Construct in a Sample of Adolescent Cannabis Users.
Objective: Although neuropsychologists use different tasks to assess decision-making (DM), the psychometric properties of these tasks remain unclear. This study aims to 1) determine whether 3 widely used measures of DM load onto a unidimensional DM construct, and 2) assess measurement invariance of the DM construct across a set of theoretically relevant covariates. We hypothesized that all DM tasks would load onto a single factor, and that this factor would exhibit evidence of measurement equivalence across covariates.
Participants and Methods: Participants were 372 adolescents (ages 14-17) at risk for escalation in cannabis use. DM was assessed via 4 indices derived from 3 neurocognitive tasks: number of risky choices on the Game of Dice Task (GDT); net score on the Iowa Gambling Task (IGT); and number of risky choices on the gain *and* loss domains of the Cups Task (CT). We used confirmatory factor analysis (CFA) to assess unidimensionality of the DM construct. We then used moderated nonlinear factor analysis (MNLFA) to examine measurement invariance of the DM construct across covariates (i.e., age, sex, IQ, past-month cannabis use frequency).
Results: The unidimensional CFA model of DM demonstrated good fit (CFI = .989; RMSEA = .038), with all indices loading significantly onto the DM factor, *p*s < .006. MNLFA results revealed that participant sex influenced mean scores on the DM construct (p = .007), such that boys had lower risk-taking than girls. Also, there was little evidence of differential item functioning across DM indices. Although participant IQ and age exhibited a moderating influence on the IGT intercept and GDT factor loading, respectively, findings were marginal (p = .03-.05) and attenuated to nonsignificance when controlling for multiple comparisons.
Conclusions: Indices from 3 different DM tasks loaded significantly onto a single DM construct. After controlling for multiple comparisons, there was no evidence of measurement invariance, suggesting that our latent DM construct was commensurate across participants.
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S. POWELL, H. TAM, M. VASSERMAN, M. JORGENSON, A. GOLD, N. KATZ & D. MONTALTO. Is Figure Weights Associated with Academic Reasoning in a Clinical Sample of Children with Neurodevelopmental Disabilities?
Objective: Figure weights (FW) is a relatively new subtest on the Wechsler Intelligence Scale for Children, 5th Edition (WISC-V) that is hypothesized to measure quantitative reasoning. This research specifically examines the relationship between FW and academic performance in children with complex neurodevelopmental presentations.
Participants and Methods: Participants included 154 children and adolescents (ages 6 - 16 years; 93 male) receiving the WISC-V as part of their standard clinical care in an outpatient neuropsychology

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clinic. Correlations and univariate ANOVAs were conducted to assess the relationship between performance on FW and subtests from the Kaufman Test of Educational Achievement, 3rd Edition (KTEA-3) and the Wechsler Individual Achievement Test, 3rd Edition (WIAT-III).
Results: FW performance was significantly correlated with math (M) and reading comprehension (RC) tasks (M: r = 0.466-0.684, p<0.001; RC: r = 0.455-0.556, p<0.001). Some evidence existed suggesting that the relationship of FW to both numerical operations and RC on the WIAT-III improved with age, although this result was not consistent on KTEA-3 (Math: WIAT3 F=2.606, p=0.042; KTEA3 F=0.669, p=0.617; RC: WIAT3 F=3.632, p=0.009; KTEA3 F=0.812, p=0.524). Lastly, doing poorly on FW did not result in greater risk of Attention-Deficit/Hyperactivity Disorder, Autism Spectrum Disorder, Language Disorder, or Specific Learning Disabilities in Reading or Math.
Conclusions: Consistent with expectations, FW is highly correlated with math computation and math reasoning; however, the impact of age on the strength of this relationship is mixed across measures. Interestingly, performance on FW was also strongly associated with reading comprehension performance. FW did not show correlations with any particular common neurodevelopmental disorder.
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K.A. RITCHIE, E.M. VOGT, M.E. NITTA, D.E. MARRA & J. HOELZLE. A statistical examination of impaired performances on the NEPSY-2.
Objective: Healthy children often obtain impaired neuropsychological test scores, yet relatively little is known about the rate at which these spurious abnormal scores are observed. Using a Monte Carlo simulation, this study investigates the rate at which children from the NEPSY-2 (Korkman, Kirk, & Kemp, 2007) normative sample obtain impaired scores on 12 NEPSY-2 subtests. Rates of expected impaired scores between normative age groups is investigated.
Participants and Methods: Normative NEPSY-2 subtest correlation matrices were utilized. Two normative samples were considered, ages 5-6 (*N* = 200; 50% Female) and ages 7-12 (*N* = 600; 50% Female). Sixteen composite scores from 12 subtests were selected for inclusion in analyses to ensure continuity of comparison between age groups. A Monte Carlo simulation was performed to determine the likelihood of observing abnormally low scores (Crawford, 2007).
Results: Expected rates of impaired scores were consistent across age groups. When "impaired" scores were defined as occurring below the 5th percentile, 41.58% healthy children from both age groups would be expected to obtain at least one or more abnormally low scores. Similarly, children in the normative samples obtained at least two or three impaired scores at rates of 19.66% and 9.59%, respectively.
Conclusions: The NEPSY-2 is designed to flexibly assess cognitive functioning across cognitive domains. However, when many subtests are administered, a meaningful proportion of healthy children are expected to obtain one or more impaired scores. This finding is relevant to consider when considering the significance of impaired score, as it may reflect normal performance variability rather than true cognitive impairment.
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C.B. SADURNÍ GARCÍA, L.F. HERNÁNDEZ, I. TOURGEMAN & M. RODRIGUEZ. The Relationship Between Cognitive and Behavioral Executive Functioning: A Study of the Inhibitory Control Scales in the D-KEFS and the BRIEF-Parent Report in a Sample of Children with Traumatic Brain Injury.
Objective: The study examined the relationship between a behavioral and cognitive measure of executive function (EF), specifically, inhibition, with the purpose of assessing the extent to which they measure the same construct. Inhibition scores from the BRIEF-PR and the Color-Word Interference Test in the D-KEFS in a sample of children with TBI were compared.
Participants and Methods: Archival data of patients who received a neuropsychological evaluation at the corresponding department of a major hospital in Florida were reviewed. Data comprises coded information for subjects referred by local providers due to various clinical presentations. A total of 25 participants met inclusion criteria. All were administered a full battery assessing cognitive and behavioral/emotional function; however, only two EF measures administered were examined.
Results: A Pearson correlation was conducted to compare scores and determine whether there is a significant relationship between the two inhibition scales. Analysis did not show a statistically significant correlation.
Conclusions: Findings were consistent with other related studies (Anderson et al., 2002; Jefferson et al., 2006) that provide valid explanations. First, this study relied on a small sample. Second, findings can be reflective of differences in neuroanatomical correlates: the dorsolateral prefrontal cortex is more involved in cognitive aspects of EF while orbitofrontal regions are more related to emotional/social aspects. Third, the BRIEF's items are more indicative of behaviors related to frontal lobe function while the D-KEFS requires integration of lower level skills (e.g., language). Finally, collection of data is different: one is based on actual performance and the other on subjective observation. Results corroborate that accurate identification of executive dysfunction is still in-progress. However, although these measures seem not to correlate, if used together, they facilitate the understanding of how children with TBI function in their environment.
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M.D. SADY, K.S. WALSH, K.K. HARDY & A. SCHEMBRI. Multivariate Base Rates & Patterns of Low Scores on the Cogstate Brief Battery.
Objective: It is well-established that healthy individuals, when given a battery of tests, are reasonably likely to obtain 1+ low scores. Knowing the rates and patterns of low performance on a particular battery of tests assists with interpretation in medical populations, to avoid over-interpretation of isolated low scores and to identify unique patterns of performance.
Participants and Methods: The normative sample of the Cogstate Brief Battery (CBB) was used (n = 38,778 children aged 10-18, n = 96 aged 6- 9). On the 4 tasks (Detection (DET), Identification (IDN), One-Back (ONB), and One Card Learning (OCL)), dependent variables were reaction time (RT; log10- transformed; DET, IDN, ONB) and accuracy (ACC; arcsine transformation of the square root; OCL). We computed multivariate base rates of low performance and validity indicators (rates of errors made on DET, IDN, and ONB).
Results: Base rates of low performance (<-1.5 SDs): Across all ages, 80% performed above the cutoff on all tasks. 15% had one low score, which was equally likely to be any task. Only 2-4% had low scores on 2 tasks, most commonly DET & IDN in older children and IDN & OCL in younger children. 2% had low scores on 3 tasks (usually the RT tasks), and <1% on all 4 tasks. At a cutoff of -2 SDs, 5% were low on one task, and only 2% were impaired on 2+ tasks. There were no significant differences in rates across ages.
Validity indicators: A majority (82%) were highly accurate on all 3 tasks, with 15% slipping on one task and 1-3% showing low accuracy on 2-3 tasks. When accuracy was low, it was virtually never on the DET task and was most common on ONB.
Conclusions: Using multivariate base rates, we identified that impairment on multiple tests in the CBB was rare but not unheard of in the normative sample, with rates comparable to other test batteries. Future research should compute these rates in neurological conditions and investigate correlates with demographic factors and with performance on paper/pencil neuropsychological tests, as well as functional outcomes.

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P. VEKARIA & J. MEISTER. Examining the Value of Neuropsychological Assessment in Youth Mental Health Clinics.
Objective: Neuropsychological assessments can play a valuable role within interdisciplinary mental health clinics. This study explores the importance of neuropsychological assessment in promoting improved treatment and educational outcomes within youth psychiatry outpatient clinics.
Participants and Methods: Participants included 163 youth who were receiving mental health services within a hospital-based or school-based outpatient mental health clinic serving primarily a Medicaid-insured urban population. Sixty-three percent of participants identified as Hispanic and 68% were from a bilingual household. The mean age of participants was 10 years (*SD=3.59*) and 74% were male. A retrospective chart review was completed for youth who had received neuropsychological screenings or full evaluations in order to determine changes in diagnoses, treatment decisions, and/or educational recommendations following neuropsychological assessment.
Results: The most common referral questions pertained to diagnostic clarification or questions related to educational recommendations. Descriptive analyses revealed that following neuropsychological screening or full evaluation, changes in diagnostic conceptualization resulted in 82.2% of cases. Medication consults and changes to the therapeutic treatment plan were recommended in 35.6% and 41.7% of referred cases, respectively. With regard to educational planning, 28.8% of youth were referred for an initial 504 plan or Individualized Education Program (IEP) following neuropsychological assessment.
Conclusions: Given the crucial need for effective mental health and educational interventions for underserved youth, this study illustrates the important role of neuropsychological assessment in providing diagnostic, treatment, and educational recommendations within interdisciplinary outpatient mental health clinics.
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E.A. WANSTALL, J. LEDOCHOWSKI, B. ANDRADE, R. MARTINUSSEN & M.E. TOPLAK. Unstructured Performance Task of Executive Function in ADHD: Psychometric Characteristics of a Novel Executive Function Measure.
Objective: An important issue in the study of executive function (EF) is the lack of concordance between performance-based measures and behavior ratings. Performance-based measures are administered under highly structured conditions and may not reflect children's performance in their everyday environments. The Unstructured Performance Task (UPT) is a novel performance-based EF task that was developed to assess self-direction. Preliminary findings of this task yielded promising results, but psychometric issues remain unexplored. First we aimed to examine core psychometric properties of the UPT. Second we aimed to better understand the underlying structure of the UPT (i.e. math and language domains) and how this relates to other measures.
Participants and Methods: Children with ADHD (n=38) and typically-developing (TD) children (n=42), aged 8-12, completed the UPT and measures of cognitive abilities (KBIT), clinical domains (CBCL) and EF (BDEFS, Trail-Making Task, and Stroop Colour-Word Test). Indices of internal consistency and split-half reliability were calculated, and correlations between the language and math domains of the UPT and other measures were calculated.
Results: The UPT had high internal consistency (α=.92) and split-half reliability (ρ=.90). Internal consistency was higher among children with ADHD (α=.93) than TD children (α=.73). Language items had higher reliability (α=.91) than math items (α=.81). The language domain was highly correlated to verbal ability (p<.001), while the math domain had unique relationships to clinical domains of anxiety (p=.004) and depression (p=.009). Performance-based EF measures were highly correlated with the language domain (p<.001), whereas EF rating measures were highly correlated with the math domain (p=.001).
Conclusions: Overall, the UPT demonstrates adequate psychometric properties (i.e. good reliability), and displays expected relationships with other measures. This suggests that the UPT may be a unique measure to assess self-direction, an important aspect of children's EF.
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Concussion/Mild TBI (Adult)

A. RINALDI, J.J. STEWART-WILLIS, D.M. SCARISBRICK, J.M. CESSNA PALAS & Z. PROCTOR-WEBER. Concordance Validity of the TOMMe10 among a mild Traumatic Brain Injury (mTBI) Veteran Sample.
Objective: Accurate detection of suboptimal or non-credible neuropsychological performance is regarded as essential to accurate diagnosis, and subsequent treatment /rehabilitation planning. This paradigm shift over the last 10 years has emphasized the inclusion of at least one PVM as standard clinical practice. Among mTBI populations, in which there are higher reported base rates of PVM failure, there has been emphasis on reducing administration length by administering only the first 10 items of Trial 1 of the Test of Memory Malingering (TOMMe10).
Participants and Methods: The current study examined preliminary data on the concordance validity of the TOMMe10 in an mTBI veteran sample. De-identified neuropsychological data for Veteran's (n=23) aged 25-56, who presented to an outpatient clinic for history of ≥ 1 mTBI were included. The sample included 19 males of the following race/ethnicity: Caucasian (62.5%), Hispanic (21.7%), African American (8.7%), and Native American (4.3%). Correlational analyses were conducted between the TOMMe10 and Word Memory Test using a Bonferroni correction, and results were significant at the .001 level.
Results: Correlational analyses revealed a strong significant inverse relationship between the TOMMe10 and TOMM Trial 1 $r(21) = -.762$, $p < .001$. Preliminary correlations between the TOMMe10 and TOMM Trial 2 $r(16) = -.411$, $p = .090$, TOMM Retention $r(13) = -.564$, $p = .029$, WMT IR $r(7) = -.256$, $p = .506$, WMT DR $r(7) = -.240$, $p = .535$, and WMT Inconsistency $r(7) = -.109$, $p = .780$ were non-significant.
Conclusions: TOMMe10 performance demonstrated excellent association with TOMM Trial 1, with fewer errors within the first ten items being associated with higher TOMM trial 1 scores, suggesting promise for the TOMMe10 as a free-standing PVT. Due to very small sample size, further validation utilizing a larger sample are warranted to support use of the TOMMe10. This measure may result in substantial time savings while maintaining optimal performance validity detection.
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Forensic Neuropsychology/Malingering/ Noncredible Presentations

S.L. AITA, J.D. BEACH, S. TAYLOR, M.N. HARRELL, J. HOLCOMBE, M. OGDEN & B. HILL. Comparison of Healthcare Professions: Documentation and Conceptualization of Malingering in Clinical Practice.
Objective: This study examined healthcare provider perceptions and frequency of diagnosing malingering/feigned impairment across medical professions (i.e., clinical/counseling physiologist, neuropsychologist, and physician).
Participants and Methods: Study sample included 111 healthcare providers (M age =42.07(SD=10.34), M years in practice=11.20

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(SD=9.83), 45.9% female, 84.7% White, 4.5% African American, 3.6% Hispanic/Latino, 3.6% Asian, 3.6% Multi-racial) from sites across the US (majority Southeast, 60.4%). Practitioners consisted of Clinical/Counseling Psychologists (23.4%), clinical neuropsychologists (27.9%), and physicians of varying medical specializations (48.6%). Participants completed a survey regarding their use and conceptualization of malingering. Base rates and chi-squared test of independence were used to examine differences among practitioners.

Results: Chi squared analysis revealed a greater proportion of both neuropsychologists (51.6%) and clinical/counseling psychologists (80.8%) have formally documented malingering in their careers compared to physicians (33.3%; $X^2(2, n=111)=15.87, p<.001$). There was no difference in conceptualization of the term "functional etiology" as malingering across the practitioners (neuropsychology=16.1%, clinical/counseling psychology=34.6%, physicians=32.1%; $X^2(2, n=110)=3.15, p=.21$). A variety of descriptions for this term were provided (e.g., psychogenic etiology). Lastly, a significantly greater proportion of physicians considered somatization to be generally synonymous to malingering (14.8%) compared to both neuropsychologists (3.2%) and clinical/counseling psychologists (0%; $X^2(2, n=111)=10.28, p=.04$).

Conclusions: Our data show that psychology professionals formally document malingering more often than physicians. The term "functional etiology" appears to be less commonly used by neuropsychologists. Last, the physicians in our sample appear to equate the definition of malingering to somatization more often than neuropsychology and clinical/counseling psychology practitioners.

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M. BASSO, R. MULLIGAN, L. LAU, J. HOFFMEISTER, B. REYNOLDS, D. GUZMAN, D. WHITESIDE & D. COMBS. The Perceptual Memory Test: A Novel Performance Validity Test.

Objective: Perceptual memory is a form of implicit/non-declarative memory. It typically recruits non-temporal-limbic structures, and may be robust to brain damage that affects explicit/declarative memory function. As such, a perceptual memory task may function as a performance validity test (PVT). The present study examined the relative validity of a novel perceptual memory task (PMT) as a PVT using a known groups design involving simulators. The PMT was compared to the Word Memory Test (WMT) and the Test of Memory Malingering (TOMM).

Participants and Methods: The PMT includes 15 degraded images of common objects, rendering them difficult to recognize. Participants attempt to identity them. Subsequently, the image is clarified and its identity explained. Three and fifteen minutes later, examinees are again shown the images, and asked to identify them from memory. A forced choice recognition trial follows. Participants included healthy undergraduates who were administered the WMT, TOMM, and PMT. 15 participants provided their best performance. 57 simulated performance of mild traumatic brain injury (MTBI) patients.

Results: A receiver operating characteristics analysis on the three PVTs revealed areas under the curve ranging from .79 to .97 (PMT), .96 (TOMM), and .96 to .98 (WMT). The Youden index established optimal cutoffs for the PMT. Its sensitivities ranged from .71 to .95, and specificities ranged from .86 to 1.00, with the forced choice index being least accurate. With standard cutoffs, WMT sensitivities ranged from .81 to .93 and specificities were 1.00. TOMM sensitivities ranged from .79 to .81, and its specificities were 1.00.

Conclusions: The PMT achieved discriminant validity that was comparable to the WMT and TOMM. Indeed, its sensitivities for recall indices generally surpassed the TOMM and WMT. These data imply that the PMT holds promise as a novel PVT. Research involving genuine patients is necessary to determine its clinical specificity.

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J.D. BEACH, S.L. AITA, S. TAYLOR, J. HOLCOMBE, M.N. HARRELL, M. OGDEN & B. HILL. Perceptions of Malingering Base Rates across Healthcare Professions.

Objective: This study evaluated practitioner (Clinical/counseling psychologist, clinical neuropsychologist, and physician) perceptions of malingering frequency in various patient groups.

Participants and Methods: Participants included 111 healthcare providers (*M* age =42.07(*SD*=10.34), 45.9% female, 84.7% White, 4.5% African American, 3.6% Hispanic/Latino, 3.6% Asian, 3.6% Multi-racial) from various healthcare practices across the US. Participants were comprised of the following healthcare professions: clinical/counseling psychology (23.4%), clinical neuropsychology (27.9%), and physicians of varying medical specializations (48.6%). Participants completed a survey assessing their perceptions of malingering base rates in the following patient conditions: Concussion, TBI, chronic pain, PTSD, ADHD, and severe psychiatric illness. Kruskal-Wallis tests were used for group comparisons and Mann Whitney U post-hoc tests were utilized for pairwise comparisons.

Results: Significant differences among groups emerged in the following patient groups: concussion ($H(2)=32.22, p<.001$), TBI ($H(2)=17.89, p<.001$), and PTSD ($H(2)=9.01, p=.01$). Across significant models, pairwise examination showed that clinical/counseling psychologists and clinical neuropsychologists reported higher base rates of perceived malingering than physicians. Additionally, results indicated that there was a significant difference among professions regarding their frequency of assessing patients for involvement in litigation/disability seeking ($H(2)=47.39, p<.001$). Specifically, clinical/counseling psychologists and neuropsychologists reported significantly higher rates of assessing patient litigation/disability seeking status compared to physicians.

Conclusions: Compared with clinical/counseling psychologists and neuropsychologists, physicians perceive the base rate of malingering in concussion, TBI, and PTSD patient groups to be lower. Furthermore, physicians reported assessing patients for litigation/disability application status far less often than psychologists.

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A. BICHLMEIER, W.D. LOPEZ-HERNANDEZ, A. BRISENO, M. RICO, E. WOO, D.J. HARDY, P.M. VESPA, D.A. HOVDA, D.L. MCARTHUR, D. PLURAD, J.M. FUSTER, K. BOONE & M.J. WRIGHT. Evaluation of a Recognition Trial for the Symbol Digit Modalities Test as a Performance Validity Measure in Acute and Chronic Traumatic Brain Injury.

Objective: To determine the optimal cut-off score for a newly developed recognition trial for the Symbol Digit Modalities Test (SDMT) for performance validity assessment in acute and chronic traumatic brain injury (TBI) survivors.

Participants and Methods: SDMT performances were assessed in acute TBI survivors (n = 28), chronic TBI survivors (n = 27), and healthy controls (n = 34). Participants also completed the Dot Counting Test (DCT) and the Rey 15-item memory test (Rey FIT), two established performance validity tests (PVTs). Acute TBI participants were tested 6 months post-injury and chronic TBI participants were tested 12 months or more post-injury. Both TBI groups suffered moderate-to-severe brain injuries as indicated by estimates of posttraumatic amnesia. None of the participants indicated motivation for feigning cognitive deficits.

Results: The groups were well matched, but the control participants were slightly, but significantly, younger that the acute TBI group. ANOVAs conducted to determine group differences on demographically adjusted SDMT scores indicated that the controls outperformed both TBI groups. Regarding the newly constructed SDMT recognition trial, An ANOVA with age as a covariate showed that all three groups were equivalent. A receiver operating characteristic curve (ROC) analysis indicated a score of 8/9 on the recognition trial resulted in 93% sensitivity and 62% specificity to failure on DCT and/or the Rey FIT. Chi-square analyses with the ROC indicated cut-off and a suggested cut-off (Boone personal

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communication) showed that both were associated with failure on PVTs, although Boone's cut-off resulted in a stronger association in contrast to the ROC indcated cut-off (Φ= .38 vs. Φ = .25).
Conclusions: The newly developed recognition trial for the Symbol Digit Modalities Test (SDMT) is associated with established PVTs. Both a ROC indicated and expert suggested cut-offs for the aforementioned recognition trial appear appropriate for use with chronic or acute TBI samples.
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Y.C. BRAW, T. LUPU & T. ELBAUM. Per-Item Response Time Measurements in the Performance Validity Subtests of the Word Memory Test: Usefulness for the Detection of Feigned Cognitive Impairment.
Objective: Response time (RTs) measures were suggested as supplementary validity indicators in forced-choice recognition memory performance validity tests (FCRM-PVTs). As part of the current study, per-item RTs were calculated for the primary validity subtests (immediate and delayed recognition; IR and DR, respectively) of the Word Memory Test (WMT). Thereby, we aimed to assess the utility of the WMT's RT measures, including RT variability, for the detection of feigned cognitive impairment.
Participants and Methods: Per-item RTs were recorded while simulators and honest controls performed the WMT's IR and DR subtests (N=29 in each group).
Results: In both the IR and DR subtests, simulators had longer mean RTs and larger variability in RTs than controls. Mean RTs in the IR-subtest had notably stronger discrimination capacity than the other RT measures, though weaker than the accuracy validity indicators. A conjunctive ("and") rule, integrating accuracy and RT data, enhanced the classification of participants in the border-zone range (according to WMT's classification scheme).
Conclusions: RT measures are useful supplementary validity indicators in the WMT. They provide the clinician with information regarding speed-accuracy tradeoff. Thereby, they offer to clarify the examinee's performance, especially when its accuracy falls in the border-zone, intermediate, range. Studies in clinical settings are, however, needed to assess the generalization of the findings to real-life neuropsychological assessments.
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D. CATRONAS, I. FERREIRA, F. GOMES, B. ROSA & S. CAVACO. Detecting feigned memory impairment: clues from oculomotor behavior.
Objective: The study goal was to explore behavioral and oculomotor responses in a performance validity test under normal effort vs. feigned memory impairment conditions.
Participants and Methods: Thirty-seven healthy individuals recruited in the community performed a digital version of Test of Memory Malingering (TOMM) adapted for eye-tracking recording (iView X™ Hi-Speed 1250 System). Twenty performed TOMM under normal effort and 17 were instructed to feign memory impairment as if they were in the initial stages of dementia to receive retirement or disability benefits. Number of correct responses (CR), response time (RT), and fixation time (FT) in old vs. new stimuli were recorded. Mann-Whitney test were used for group comparisons and Wilcoxon test was applied to compare fixation times in old vs. new stimuli.
Results: In comparison to the normal effort group, participants under feigning condition produced fewer correct responses ($p<0.001$) and longer response times ($p<0.01$) on the three test trials. The oculomotor recording of the normal effort group showed an early familiarity preference (longer fixations on previously presented stimuli than on new stimuli) in the 1st and 2nd evaluation trials; and a later novelty preference (longer fixations on new stimuli than on previously presented stimuli) in the retention trial ($p<0.05$). The group under feigning condition showed a novelty preference (longer fixations on new stimuli than on previously presented stimuli) in all three trials ($p<0.05$).
Conclusions: Healthy individuals feigning memory impairment have a distinct behavioral and oculomotor response pattern, reflecting an increased effort to inhibit a natural response. Oculomotor measures may be useful to detect exaggeration or fabrication of cognitive dysfunction.
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C.F. CERTILMAN, A. KIVISTO, K. WHITNEY, J. WALL & B. MOSSBARGER. Use of the Gordon Diagnostic System to Assess Performance Validity in Veterans with Mild Traumatic Brain Injury.
Objective: Assessing performance validity on neuropsychological batteries is crucial when there is potential for secondary gain. In addition to stand-alone performance validity tests (PVTs), embedded PVTs are also important as they are less susceptible to coaching and increase the sensitivity of the overall malingering battery without added time and resources. There is no research examining the utility of the Gordon Diagnostic System (GDS) as an embedded PVT, despite utility observed with other continuous performance tests. This study used a criterion-groups validation design to determine the classification accuracy of two GDS variables in distinguishing between patients with and without malingered neurocognitive dysfunction (MND).
Participants and Methods: Participants were 60 veterans referred for possible Mild Traumatic Brain Injury (mTBI) in a Midwestern Veterans Affairs hospital (95% male, mean age=38.68 (*SD* =11.81)). Clinical evaluations included the GDS, Test of Memory Malingering, Medical Symptom Validity Test, Rey Auditory Verbal Learning Test (RAVLT), and Wechsler Adult Intelligence Scale-IV (WAIS-IV) Digit Span. Participants were sorted into MND (n=28) and non-MND (n=32) groups based on Slick et al.'s (1999) criteria.
Results: GDS omissions demonstrated acceptable classification accuracy (AUC = .75) in distinguishing between MND and non-MND groups. GDS commissions demonstrated excellent classification accuracy (AUC = .83) and was therefore analyzed further. A cut score of ≥2 commissions correctly classified 81.67% of participants with 75% sensitivity and 88% specificity. Incremental contributions of the GDS were examined when combined with two other embedded PVTs individually and in combination (the RAVLT Recognition total score and WAIS Digit Span scaled score), finding that commissions added to the model.
Conclusions: Results support the use of GDS commissions scores as a reliable indicator of MND in veterans with mTBI when used as part of a comprehensive system.
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A.J. D. CROW, P.J. MOBERG & D. ROALF. Reaction Time and Performance Consistency as Indicators of Performance Validity: A Preliminary Investigation using the Victoria Symptom Validity Test.
Objective: Deliberate slowed responding is the second most employed malingering strategy during neuropsychological assessment (Tan, Slick, Strauss, & Hultsch, 2002). Despite this, there is limited investigation into the utility of reaction time (RT) in evaluating performance validity. We hypothesized individuals classified with questionable or invalid responding will have longer mean RT and higher within-individual reaction time variability (RTV). Secondly, we expected these indices would predict malingered performance.
Participants and Methods: Ninety-one individuals (63.7% male) with mean age 49.0 years (ranging 17 to 79 years) of primarily Caucasian decent (87.9%) performed the Victoria Symptom Validity Test (VSVT [Slick, D., Hopp, G., Strauss, E., & Thompson, G. B. (1997). VSVT: Victoria Symptom Validity Test (Version 1.0). Odessa, FL: Psychological Assessment Resources.]) during individualized neuropsychological evaluations.

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Results: Wilcoxon-Mann-Whitney *U*-tests demonstrated individuals with malingered performance based on accuracy scores had longer mean RT and higher RTV on easy and difficult items ($U \geq 497$, $p \leq .001$). The difference in standardized RTV between conditions discriminated individuals with malingered performance from individuals with compliant performance ($U = 170$, $p = .03$). Logistic regression analyses predicting malingering status based on easy items indicated the difference in standardized mean RT between conditions was a significant predictor ($OR = 0.08$, 95% CI [0.00, 0.41], $Z = -2.27$, $p = .02$), while the difference in standardized in RTV trended towards significance ($OR = 8.88$, 95% CI [1.39, 169.21], $Z = 1.81$, $p = .07$). In a model predicting malingering status based on difficult items, the difference in standardized RTV was a significant predictor ($OR = 2.15$, 95% CI [1.09, 4.61], $Z = 2.16$, $p = .03$).
Conclusions: These data show that reaction time metrics and within-person performance inconsistencies provide additional information about malingering and may improve performance validation.
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S. ERICKSON & J. CARON. Dispelling Folklore About Trial One Memory and Digit Span Forward Differences.
Objective: Qualitative methods to identify noncredible performance are often used in clinical practice but lack much empirical validation. Clinical lore suggests an embedded performance validity test (PVT) involving the comparison of two scores both thought to measure attentional "span": number of words recalled on the first trial of a list memory task and the longest number of digits said on a digits-forward task. Limited research suggests the difference between number of words and digits should not exceed two (Lezak, Howieson, Bigler, & Tranel, 2012). It was hypothesized the false positive rate for noncredible performance should be less than 10%, which would justify its use in clinical practice. This study empirically tested the accuracy of the proposed embed in a mixed clinical sample of veterans.
Participants and Methods: This archival study examined difference scores for 125 veterans aged 22 to 93 (M=57) referred for neuropsychological evaluation from 2014-2018. Diagnoses included 12% major neurocognitive disorder (Major NCD), 11.2% Mild NCD, 9.6% neurodevelopmental disorder, and 3.2% no diagnosis. The majority had a psychiatric diagnosis (67.2%), with 20% having a comorbid neurological/medical and/or psychiatric disorder. Exclusion criteria was failure on any PVT. The specificity of the difference score was calculated for the mixed clinical sample. Further, participants were dichotomized by age (under age 65 N=74, age 65 and over N=51) to evaluate if age cohort affected specificity.
Results: The specificity for the difference score was 54%, far below the traditional 90% used for most PVTs. Although younger subjects were classified better than older subjects (62% vs. 41%), both still had a very high false positive rate.
Conclusions: Despite clinical lore, the proposed qualitative embed lacks sufficient specificity for clinical use due to unacceptably high false-positive classification rates.
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O. GAASEDELEN, D. WHITESIDE, E. ALTMAIER, C. WELCH & M. BASSO. Validation of a Novel Symptom Validity Test for the Personality Assessment Inventory Utilizing an Item Response Theory Framework.
Objective: Item response theory (IRT) provides several advantages to classical test theory approaches to measure construction and validation, namely its emphasis on item-level analysis; however, IRT remains underutilized in neuropsychological measurement construction and validation. This study presents the results of an IRT Graded Response Model (GRM; Samejima, 1997) fit to ten items that comprise a novel symptom validity test (SVT) for the Personality Assessment Inventory (PAI; Morey, 1996).
Participants and Methods: The validation sample included 306 consecutive outpatient clinical referrals for neuropsychological evaluation. All participants completed a comprehensive examination that included at least one free-standing performance validity test (PVT), at least two embedded PVTs, and the PAI. Participants who failed a free standing PVT and at least one embedded PVT were classified into the FAIL group (n=49), and all others were classified into the PASS group (n=257). The ten items that comprised the novel symptom validity test comprised of those that empirically showed evidence for discrimination between the PASS and FAIL group (as defined by t-value and factor analysis results). These ten items were fit to the GRM.
Results: Together, the ten items showed adequate reliability (Cronbach's alpha = 0.77), and overall fit to the GRM was good (Root Mean Square Error of Approximation = 0.05). Eight out of ten items displayed good fit to the GRM, demonstrating high discriminability ($a > 1.08$), and most reliably capturing information between -1.5 and 3 standard deviations of the latent trait (i.e., cognitive response bias).
Conclusions: Evidence suggests the novel SVT demonstrates good reliability, with highly discriminating items that capture more overt expressions of cognitive symptom exaggeration. Future research can attempt to discern items that reliably capture more subtle expressions of symptom exaggeration.
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C.H. DOMEN, M.R. GREHER, P. HOSOKAWA, S.L. BARNES, B.D. HOYT & T.R. WODUSHEK. Classification Accuracy of Multiple Embedded Performance Validity Tests in a Sample of Patients with Multiple Sclerosis.
Objective: Data for the use of embedded performance validity tests (ePVTs) with multiple sclerosis (MS) patients is limited. The purpose of the current study was to determine whether ePVTs previously validated in other neurological samples perform similarly in an MS sample.
Participants and Methods: The analyzed sample of MS patients (N = 108) was 70% female and predominantly Caucasian (88%), with an average age of 45.5 years (SD = 12.6) and an average education of 14.7 years (SD = 2.5). All were native speakers of English. Participants were classified as either credible performers (CPs) or non-credible performers (NCPs), with non-credible performance defined as failure on the easy trials of the Medical Symptom Validity Test (MSVT; n = 13). ePVTs of interest included Reliable Digit Span (RDS), CVLT-II delayed forced choice recognition (CVLT-FC), BVMT-R retention percentage (BVMT-Re%), COWA and Animal Fluency T-scores (COWA-T & Animal-T), and JOLO raw score (JOLO-r).
Results: Using the Wilcoxon Rank Sum test, NCPs performed worse than CPs on RDS, CVLT-FC, COWA-T, Animal-T, and JOLO-r (all p-values < .01). Receiver Operating Curve (ROC) analyses revealed that RDS (AUC = .87) and COWA-T (AUC = .82) had excellent classification accuracy, whereas CVLT-FC (AUC = .76), Animal-T (AUC = .76), and JOLO-r (AUC = .76) had acceptable classification accuracy. Cut-off scores yielding 90% specificity were as follows: RDS = 7, CVLT-FC = 15, COWA-T = 32, Animal-T = 35, and JOLO-r = 15.
Conclusions: RDS, CVLT-FC, COWA-T, Animal-T, and JOLO-r are each able to differentiate CPs from NCPs with an acceptable level of accuracy in a population of MS patients. With the exception of JOLO-r, for which a more conservative cut-score should be applied, cut-off scores yielding 90% specificity were generally consistent with prior published values. BVMT-Re% was not different between CPs and NCPs and should not be used.
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S. HOLMQVIST, J. PARK & A. LANSING. Contributions of Trauma-Related Indicators to Cognitive Deficits Among Delinquent Girls.

Objective: Despite associations between trauma and cognitive status (e.g., PTSD and working memory), few studies examine links between trauma and cognitive deficits prominent among delinquent youth (e.g., language difficulties). We explored relationships among trauma indicators (exposure, symptoms), associated clinical features (e.g., alexithymia, affect-driven impulsivity), and language skills in delinquent girls with high trauma-exposure.

Participants and Methods: Delinquent girls (n=134) completed a neuropsychological battery measuring auditory processing skills (SCAN-III), and receptive (PPVT-4) and expressive (EVT-2) vocabulary. Trauma indicators and clinical features were assessed with self-report and structured interviews (e.g., CPSS, CAPSCA, UPPS-P). Backward linear regressions were used to evaluate demographic, trauma and clinical predictors of language.

Results: Over half of the girls were below average on receptive and expressive vocabulary. All language tests were significantly predicted by models including minority status (African American, Hispanic) predicting lower scores, and better verbal intellectual abilities (WASI-2) predicting higher scores ($p<.01$). More frequent trauma re-experiencing symptoms, and less impulsivity when experiencing negative affect, significantly predicted 54% of the variance in lower receptive vocabulary when combined with race and verbal IQ ($F(5,107)=24.75$, $p<.01$). Less frequent trauma-related avoidance symptoms and older age significantly predicted worse auditory processing abilities ($R^2=.401$, $F(5,102)=13.66$, $p<.01$). No significant predictors emerged for the EVT-2 beyond race and verbal IQ.

Conclusions: Trauma symptoms, negative affect impulsivity, and demographics emerged as important predictors of cognitive functioning in delinquent girls. Future research should focus on identifying more effective approaches to address disrupted cognitive development in high trauma-exposed youth, which may improve their developmental trajectory and higher order language functioning.

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E.A. JONES, K. TELSON & A. LANSING. Neurocognitive Contributions to Recidivism Among Early-Onset Persistent Delinquent Youth.

Objective: This study sought to uncover neurocognitive factors related to recidivism in a juvenile delinquent population. While previous criminal activity is a well understood predictor of re-arrest, recent models illustrate non-criminal factors, such as Adverse Childhood Experiences (childhood maltreatment, familial distress) contribute to recidivism as well. Goals of this study include: 1) evaluating neurocognitive and trauma profiles in relation to recidivism events and; 2) analyzing time until re-arrest through separate models involving neurocognition for boys and girls.

Participants and Methods: This study utilizes data from a life-event study on early onset persistent delinquent [EOPD] boys and girls (n=93). Participants received neuropsychological testing (e.g., receptive/expressive language: SCAN-A, PPVT-4, EVT-2; WASI IQ, *Delis–Kaplan Executive Function* System) and trauma interviews (e.g., SIDES-R, CAPS-CA, ICG-19). Survival analyses, using official juvenile and adult arrest records, were used to determine if these domains were associated with re-arrest.

Results: Initial findings show significant gender differences in nearly all independent and multi-variate models across all evaluated neurocognitive and trauma measures. When separated by gender, developmental trauma disorder symptoms were a significant univariate predictor for boys' recidivism. Once demographic controls (e.g., race) were introduced, expressive language (EVT-2) remained consistently significant in predicting EOPD boys' hazard to recidivism ($p = .027$). The EVT-2 model for boys further improved with the addition of IQ variables ($p = .010$). Results showed few consistently predictive measures for females.

Conclusions: These results highlight expressive language as a non-criminal factor that may reduce EOPD boys' ability to avoid re-arrest. Future research should focus on identifying other underlying neurocognitive abilities potentially related to trauma exposure and indicative of academic disruption, delinquency, and recidivism in both genders.

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R.J. KANSER, L.J. RAPPORT, S.D. PATRICK, R.A. HANKS & J.R. BASHEM. Detecting Simulated Traumatic Brain Injury with Eye-tracking.

Objective: Eye-tracking is a promising technology to enhance assessment of performance validity. Research has established that ocular behaviors are reliable biomarkers of (un)conscious cognitive processes. Experimental research on deception has shown that ocular behaviors reliably distinguish feigned concealment of information from honest responding. This study examined the incremental utility of incorporating eye-tracking indices into a clinical PVT to distinguish adults with verified TBI from adults coached to feign cognitive impairment.

Participants and Methods: Participants were 49 adults with moderate to severe TBI (TBI), 47 healthy adults coached to simulate TBI (SIM), and 67 healthy adult comparisons providing full effort (HC). A computerized version of the Warrington Recognition Memory Test of Words (RMT) was completed in the context of a full neuropsychological battery.

Results: Kruskal-Wallis tests revealed that eye-tracking indices did not differ among the groups during presentation of stimulus items but did differ during forced-choice trials. Compared to TBI and HC, SIM had significantly more transitions, fixations, and time spent looking at correct and incorrect response options. Logistic regressions and ROC curve analyses showed that accuracy was the best predictor of SIM vs. HC. For SIM vs. TBI, eye-tracking variables exceeded accuracy in distinguishing the groups. Eye-tracking added incremental predictive value to accuracy for both SIM-HC and SIM-TBI discriminations.

Conclusions: Eye-tracking indicated that persons feigning TBI showed multiple signs of greater cognitive effort than persons with verified TBI and healthy comparisons. Effectiveness of RMT accuracy and eye-tracking depended on the groups compared. In the comparison of greatest interest (SIM vs. TBI) eye-tracking best predicted group status and led to "excellent" discrimination when combined with accuracy. Eye-tracking may be an important complement to traditional accuracy scores on PVTs.

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W.D. LOPEZ-HERNANDEZ, A. BICHLMEIER, M. RICO, A. BRISENO, E. WOO, D.J. HARDY, P.M. VESPA, D.A. HOVDA, D.L. MCARTHUR, D. PLURAD, J.M. FUSTER, K. BOONE & M.J. WRIGHT. Evaluation of the new Dot Counting Test Cut-Off Score in Acute and Chronic Traumatic Brain Injury.

Objective: To determine if the recently reported lower cut score (McCaul et al., 2018) for the Dot Counting Test (DCT) was useful for acute and chronic traumatic brain injury (TBI) survivors.

Participants and Methods: DCT performances were assessed in acute TBI survivors (n = 28), chronic TBI survivors (n = 27), and healthy controls (n = 34). Acute TBI participants were tested 6 months post-injury and chronic TBI participants were tested 12 months or more post-injury. Both TBI groups suffered moderate-to-severe brain injuries as indicated by estimates of posttraumatic amnesia. None of the participants indicated motivation for feigning cognitive deficits.

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Results: The groups were matched on education, sex, and race/ethnicity, but the control participants were slightly, but significantly, younger that the acute TBI group. An ANOVA with age as a covariate indicated that all three groups were equivalent in DCT E-scores. Both the conventional and new cut-off scores resulted numerically different failure rates in the controls (conventional: 6%; new: 12%), chronic TBI (conventional: 15%; new: 22%), and acute TBI groups (conventional: 18%; new: 29%), although these group differences did not reach statistical significance on chi-squared tests.
Conclusions: While the newly suggested DCT cut-off score resulted in greater failure rates in healthy and TBI participants, this difference did not result in significantly disproportionate failure rates in chronic or acute TBI survivors. These data suggest that the new DCT cut-off scores may be useful for TBI samples.
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M.G. MCFARLAND & J.L. LYLES. Relationship between General Intelligence and Performance Validity in Latin Americans with TBI.
Objective: Neuropsychologists suggest the use of performance validity instruments as measures that detect exaggerated symptomatology and assess examinee's credibility. These measures are designed to maintain insensitivity to genuine cognitive deficits. Recent research has shown that scores on these measures are affected by low Full Scale Intelligence Quotient (FSIQ) scores, especially on individuals with mental retardation or FSIQ scores lower than 70. Thus, demonstrating a consistent correlation between low FSIQ scores and reduced performance on validity measures. This study looks at the effects of FSIQ scores on an embedded measure of performance validity within a sample of Latin American individuals diagnosed with a Traumatic Brain Injury (TBI).
Participants and Methods: Data was collected from 18 Hispanic individuals with a diagnosis of TBI who were evaluated for Worker's Compensation cases at a small private practice. Information was obtained from the neuropsychological evaluation included demographic information, measures of effort, mood, and FSIQ. Correlational analysis was conducted to assess the relationship between FSIQ and failure to maintain set on the Wisconsin Card Sorting Test (WCST).
Results: Results of the correlational analysis revealed a significant positive relationship between overall IQ and number of times an individual failed to maintain set on WSCT. Specifically, individuals with higher FSIQ scores demonstrated more failures to maintain sets than individuals with lower FSIQ scores.
Conclusions: Results of this study are contradictory to previous research and demonstrate a need to further analyze the relationship between FSIQ and measure of performance validity. In addition, cut-off scores for Latin Americans need to be evaluated to assess their accuracy in assessing effort in this population.
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J.O. MOURAS, J. KEAVENEY & E. SCHERTEL. Examining the TOMM Comparing Trial 2 and Consistency Between Trial 1 and 2 to Determine Effort.
Objective: Research has indicated that the Test of Memory Malingering (TOMM; Tombaugh, 1996) Trial 2 score below 45 may not best identify insufficient effort due to test coaching or evaluees noticing the test is not difficult (Jelicic, Ceunen, Peters, &Merckelbach, 2011; Mossman, Gervais, Wygant, & Hart, 2018). As this cutoff determines effort on the TOMM, those giving suboptimal effort may not be identified, leading to inaccurate conclusions. As the hallmark of malingering is inconsistency, it is proposed that consistency between Trial 1 and 2 item responses (Consistency) is a better measure of effort than Trial 2 alone. Hypotheses are: (1) There will be a significant positive correlation between TOMM Consistency and 3 embedded effort measures; and (2) Consistency will be more predictive of those who give insufficient effort on the TOMM than Trial 2.
Participants and Methods: Archival data from 100 private practice patients was collected. Subjects included 37 males and 63 females with a mean age of 45 and 14 years of education. Scores on the TOMM were compared to several embedded measures of effort; Forced Choice Recognition from the California Verbal Learning Test, Second Edition (CVLT-II; Delis, Kramer, Kaplan, & Ober, 2000), Logical Memory Recognition, and Visual Reproduction Recognition from the Wechsler Memory Scales, Fourth Edition (WMS-IV; Wechsler, 2009). Each subject was given a score of 1 (Good Effort) or 0 (Poor Effort) based on the standard of using less than 45 out of 50 on Trial 2, or below 90% for consistency scores as the cutoff.
Results: TOMM consistency was correlated with three embedded measures of effort. Step-wise regression demonstrated that TOMM Trial 2 predicted 27% of the variance in effort status and TOMM consistency score accounted for an additional 42% of variance in effort.
Conclusions: TOMM consistency score is a viable measure of effort and is a better predictor of insufficient effort than the Trial 2 score alone.
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L. NAKHUTINA, R. DEEB & A. GRANT. Assessment of Performance Validity in a Clinical Sample of African-Caribbean Adults with Neurological Impairments.
Objective: The Reliable Digit Span (RDS) is one of the most well-researched embedded performance validity tests (PVTs). RDS cutoff score of ≤ 7 is commonly referenced for detection of suboptimal effort. However, data from minority and non-European cultural groups are lacking, and emerging research suggests that RDS cutoff may need to be adjusted. The present study retrospectively examined the TOMM (Test of Memory Malingering) and RDS performance in a mixed clinical sample of nonlitigating African-Caribbean adults.
Participants and Methods: RDS was calculated for consecutively referred individuals (*N*=72; 53% Female; mean age=50, sd=12.12, mean years of education=11.4, sd=4.3, range 0-20 years), many of whom also completed TOMM (n=53) as part of their neuropsychological assessment. The majority of patients were from Jamaica (32%), followed by Trinidad (26%), Guyana (19%) and Haiti (13%). Diagnoses included epilepsy (32%), CVA (21%), MCI or early dementia (11%), and 47% had a head injury. All patients spoke English as their primary language (14% bilingual English-French Creole). TOMM and RDS results were characterized, and RDS relationship with education and cognitive performance was examined using Pearson correlations.
Results: Among those who passed the TOMM (Trial 2 ≥ 45; 89%), RDS correlated with education (r=0.40, p=0.03), GAI (r=0.61, p<0.01), and cognitive functioning (RBANS Total r=0.62, p<0.01). There was a high prevalence of RDS below criteria performance among those who passed the TOMM (at cutoff score ≤ 7: 46%; ≤ 6: 25%; ≤ 5: 16%). Prevalence of RDS ≤ 4 was less frequent 6.8%.
Conclusions: Preliminary findings from this mixed clinical group of African-Caribbean patients indicate high failure rate on RDS with strong associations with education and cognitive factors. Use of multiple PVTs and review of medical, behavioral, and collateral data is required to prevent excessive false positive identifications, particularly in cross-cultural evaluations.
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D. O'CONNELL. The Association Between Psychopathic Personality Traits and Executive Functions.

Objective: Both elevated levels of psychopathic personality traits and deficits in executive functions (EF) have been associated with myriad problematic behaviors (e.g., substance abuse, risky sexual behavior, and poor decision-making). The association between psychopathic personality traits and performance on EF has been well-studied; however, results across previous research findings have been inconsistent. The current study was the first to use the triarchic model of psychopathy (i.e., boldness, meanness, and disinhibition) with objective measures of EF to investigate this association in college men and women.

Participants and Methods: 120 participants (56% female), aged 18-35, 56% Caucasian completed one, two-hour session including a self-report measure of psychopathy and a battery of EF tasks. Multiple regressions examined the association between gender, boldness, disinhibition, and meanness as well as the two-way interaction terms among the components of the triarchic model of psychopathy and performance on each EF task. Gender, substance use, and IQ estimated from a word reading task were controlled for in the analyses.

Results: Psychopathic personality traits were not associated with performance on any measures of EF. Rather, an estimate of IQ was significantly, negatively correlated with participant performance on four out of six measures of EF.

Conclusions: The results of the present study support the assertion that psychopathic personality traits are not associated with performance on lab-based measures of EF in a college sample. Thus, the findings support the assertion that it is not psychopathic personality traits themselves, but rather a tendency to engage in antisocial behavior or chronic substance abuse that is associated with deficits in EF. Given the connection between EF and prefrontal cortex (PFC) the results of the present study refute the assertion that psychopathic personality traits are the result of neurobiological deficits in the PFC.

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J.H. ORY & G.D. BIEN. Is Effort on Neuropsychological Testing Predictive of Overutilization of Healthcare Resources? A Preliminary Analysis.

Objective: Horner, VanKirk, Dismuke, Turner, and Muzzy (2014) found that patients who failed performance validity testing (PVT) used more VA health services than patients who did not fail PVT. They theorized that this may be due to inconclusive diagnostic tests or a general failure to cooperate fully in their own healthcare. Independent replication of the Horner study at an unaffiliated VAHCS is underway. Preliminary findings follow.

Participants and Methods: The medical records of 474 patients (Education = 13.46 (SD = 1.85), Age = 56.10 (SD = 13.46), Male = 86.70%) in an outpatient neuropsychology clinic were reviewed and sorted by conclusion as pertaining to their effort, which were identified as good, suspect, or poor. Information regarding diagnoses, secondary gain, and use of hospital resources were [BGD1] also collected for the 12 months following their neuropsychological consultation. For this preliminary analysis, correlations were examined between judgment as pertaining to effort and select outcomes (i.e., ER visits, days as inpatient, presence of secondary gain, and service connection percentage).

Results: Of 474 patients reviewed for this analysis, 315 provided good effort (suspect effort = 76, poor effort = 83). In contrast to Horner et al., effect sizes for the relationship between effort on healthcare utilization was negligible (ED visits: r = .01; Inpatient: r = .06). Small effect sizes were noted for the presence of secondary gain (r = .17) and percentage service connection (r = .12), with probability of suboptimal effort increasing with both.

Conclusions: While this preliminary analysis failed to replicate the findings of Horner et al., it is noteworthy that in their study, patients with serious medical conditions, neurocognitive impairment, and secondary gain were excluded from analysis. More comprehensive analyses are planned to more closely replicate the methodology of Horner and colleagues.

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S.D. PATRICK, L.J. RAPPORT, R.J. KANSER, R.A. HANKS & J.R. BASHEM. Performance Validity Assessment Using Response Time on the Warrington Recognition Memory Test.

Objective: Response time (RT) shows promise as an index to enhance detection of purposefully-low performance validity, because it has a finer metric and is more subtly embedded in tasks than traditional accuracy scores. RT has proven valuable in enhancing stand-alone performance validity tests (PVTs) such as the TOMM. Ideally, similar indexes could be embedded in clinical tests used as PVTs. This study tested the incremental utility of RT on the Warrington Recognition Memory Test (RMT) in classifying bona fide versus feigned TBI.

Participants and Methods: Participants were 174 adults in three groups: 55 with moderate-to-severe TBI (TBI), 69 healthy comparisons (HC) instructed to put forth full-effort, and 49 healthy adults coached to simulate TBI (SIM). Participants completed a computerized version of the RMT in the context of a comprehensive neuropsychological battery. Groups were compared on several RT variables and the traditional accuracy score.

Results: Kruskal-Wallis tests differed significantly among the three groups for RT mean (RTm), correct (RTc), incorrect (RTi), and ratio of RT for correct to incorrect responses (RT C/I). Post hoc tests indicated that RTm and RTc differed significantly between all groups, and RT C/I differed between TBI and SIM. RT coefficient of variation (CV) did not differ significantly among the groups. Logistic regressions, ROC curves, and diagnostic efficiencies were examined. Individually, all models for SIM-HC contrasts and all but one model (CV) for SIM-TBI contrasts were significant. However, results for SIM-TBI were substantially weaker than SIM-HC results. For SIM-TBI contrasts, RTm, RTc, and RT C/I added significant incremental information to number correct.

Conclusions: In some ways, RT indexes from the RMT outperformed those reported for the TOMM observed in prior research. Nonetheless, gains in diagnostic efficiency were modest. Overall, the effectiveness of the RT indexes was substantially inflated for SIM-HC as compared to SIM-TBI contrasts.

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J.K. RAI & L.A. ERDODI. Classification Accuracy of TOMM Trial 1 Cutoffs in a Large Medical-Legal Sample.

Objective: Previous studies investigating the clinical utility of Trial 1 of the Test of Memory Malingering (TOMM; Tombaugh, 1996) have proposed a wide range of cutoffs (i.e., Trial 1 ≤35 through ≤45). The variability in cutoffs appears to be due in large part to different criterion measures used across studies, with conservative criterion measures (e.g., the standard TOMM Trial 2 cutoff) resulting in more conservative Trial 1 cutoffs. This study investigated the classification accuracy of various Trial 1 cutoffs against measures known to have relatively high sensitivity to invalid performance.

Participants and Methods: Data were analyzed from 1759 adults referred for psychological testing in a medical-legal setting. Sensitivity and specificity of various Trial 1 cutoffs were evaluated against the Word Memory Test (WMT; Green, 2003) and against more liberal empirically-supported cutoffs on TOMM Trial 2 (≤48 and ≤49).

Results: Across Trial 1 cutoffs, sensitivity was highest against Trial 2 ≤48 and lowest against the WMT. Trial 1 ≤42 was the most liberal cutoff to achieve acceptable specificity (≥.90) against Trial 2 ≤48 (sensitivity = .86), while Trial 1 ≤43 produced adequate specificity against Trial 2 ≤49 (sensitivity = .71) and the WMT (sensitivity = .57). Cutoffs

at or below ≤40 were overly conservative, producing a <5% false positive rate across criterion measures.
Conclusions: Trial 1 cutoffs as liberal as ≤42 and ≤43 are appropriate for use with medical-legal samples. Taken together with past research, the results highlight the impact of criterion measures on the signal detection properties of predictor performance validity tests (PVTs). Given the substantial proportion of invalid cases that can go undetected when using PVTs in isolation, multiple PVTs should be used to monitor performance validity in the context of neuropsychological assessment.
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Z. RESCH, E. SCHULZE, J. SOBLE & N.H. PLISKIN. Base Rates of Performance Validity Test Failure Among Electrical Injury Patients.
Objective: The objective of this pilot study was to investigate base rates of performance validity test (PVT) failures in a well-defined clinical sample of electrical injury (EI) patients. In total, 5 commonly administered PVTs were examined: two freestanding (i.e., Test of Memory Malingering [TOMM], Victoria Symptom Validity Test [VSVT]) and three embedded (i.e., Reliable Digit Span [RDS] from the Wechsler Adult Intelligence Scale, Forced Choice Recognition [FCR] from the California Verbal Learning Test – Second Edition, Failures to Maintain Set [FMS] from the Wisconsin Card Sorting Test).
Participants and Methods: Participants were 49 adult EI patients referred for comprehensive neuropsychological evaluation. The sample was predominately male (*n*=31; 84%) and Caucasian (*n*=33; 92%) with a mean age of 44.8 years (*SD*=11.4) and a mean education of 12.6 years (*SD*=1.7). Most patients (77.6%) were involved in litigation or disability claims related to their injury at the time of evaluation. Cutoff scores for biased responding were as follows: TOMM Trial 2 < 45; VSVT Difficult Items score < 18; RDS ≤ 6; FCR ≤ 14; FMS ≥ 4.
Results: Findings revealed the following PVT failure rates for each of the specific validity indicators: TOMM (*n*=3/37; 8.1%); VSVT (*n*=9/40; 22.5%); RDS (*n*=2/36; 5.6%); FMS (*n*=3/41; 7.3%); and FCR (*n*=4/43; 9.3%). Overall PVT failure rates in the sample were as follows: 0 PVTs failed (34/49, 69.4%); 1 PVT failed (10/49, 20.4%); 2 PVTs failed (4/49, 8.2%); and 3 PVTs failed (1/49, 2.0%).
Conclusions: Failure rates vary widely across various PVTs among EI patients. Discrepancies between PVTs are likely explained by differences in sensitivity to invalid performance or low effort. Among EI patients, these preliminary findings suggest the VSVT may be most sensitive to noncredible performance.
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L.N. RICHEY & N.A. DONINGER. A Comparison of Performance Validity Measures in Predicting MMPI-2 Lie Scale Results.
Objective: This study examined the relationship between tests of performance validity (PVT) and symptom validity (SVT) among claimants undergoing independent neuropsychological evaluations. Previous research comparing PVTs with SVTs has examined symptom validity with respect to over-reporting functional impairment, whereas the current study focused on how PVTs predict under-reporting of psychological symptoms and minimization of negative personality characteristics.
Participants and Methods: The sample included 105 claimants presenting with psychological and cognitive complaints who were assessed in a forensic private practice setting. Participants were administered multiple PVTs (WAIS-IV reliable digit span (RDS), California Verbal Learning Test forced choice recognition (CVLTfc), Test of Memory Malingering trial 2 (TOMMt2)/retention (TOMMre)) and a SVT (MMPI-2 Lie scale (MMPIL)).
Results: Analyses revealed moderate yet significant (p<.001) correlations between the MMPIL scale and PVTs (RDS: r=-.48, CVLTfc: r=-.32, TOMMt2: r=-.33, TOMMre: r=-.32). Further substantiating these relationships were statistically (p<.007) and practically (d=0.56–0.83) significant differences on t-tests comparing MMPIL scores in above and below PVT cutoff conditions. A factorial ANOVA yielded significant main effects of RDS and TOMMre on MMPIL (F=5.94, p=.017; F=4.32, p=.040) such that MMPIL means associated with insufficient effort on both PVTs were higher (M=63.64) than those exhibiting sufficient effort (M=53.63), yielding a large effect size (d=1.13). Classification accuracy analyses indicated that PVTs had higher specificity (.78–.86) than sensitivity (.29–.53) in identifying above average SVT scores, with positive predictive values of .52 to .79.
Conclusions: Data suggest that claimants who put forth insufficient effort on PVTs are more likely to endorse virtuous personality characteristics in order to appear psychologically adjusted on SVTs. These findings further support the idea that constructs assessed by PVTs and SVTs are interrelated.
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K. SHEIKH, K. VALENTINE & C.P. PECK. Lowering the Dot Counting Test E-Score Cut-Off Misclassifies Credible Older Adults.
Objective: The Dot Counting Test (DCT) was designed to detect feigned cognitive impairment. Boone et al. (2002) found that a ≥17 E-score produced >90% specificity and 75% sensitivity in a credible, non-demented outpatient sample. Recently, McCaul et al. (2018) was able to increase sensitivity rates by lowering the cutoff to ≥13.8, while maintaining adequate specificity. This modified cutoff has not been examined in an older adult sample. As such, the goal of this study was to investigate the classification accuracy of McCaul's cutoff in a sample of credible older adults.
Participants and Methods: A total of 37 archival files met criteria for study inclusion: 1). ≥ 50-years-old, 2). Passed Reliable Digit Span (>6) or Test of Memory Malingering (T1 = >45), 3). No external incentive, and 4). IQ scores > 80. Sample demographics revealed mean age of 67.49 (9.6), mean IQ of 103 (10.8), and mean education years of 13.3 (2.4). Diagnoses were dementia (n = 7), mild cognitive impairment (MCI; n = 12), mood disorders (n = 15), traumatic brain injury (TBI; n = 2), and other neurologic (n = 1). The sample was 62% female, 89% Caucasian, and 86% right-handed.
Results: McCaul's modified cutoff correctly classified 25/37 (68%) credible older adults, while 12/37 were misclassified; misclassified individuals belonged to the dementia (4 of 7), mood (4 of 15), MCI (3 of 12), and Other Neurological (1 of 1) groups. Boone's cutoff resulted in accurate classification of 33/37 (89% specificity) credible individuals; misclassified individuals were diagnosed with dementia (n = 1), MCI (n =1) and mood disorders (n = 2). When the cutoff was adjusted to >17, classification accuracy improved to 35/37 (95%).
Conclusions: This study found that the McCaul modified cutoff misclassified 32% of credible older adults as non-credible, while only 11% were misclassified using Boone's 2002 cutoff. Using a >17 cutoff improved classification accuracy to 95% in our sample (35/37). Implications are discussed, together with limitations and future directions.
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J. SMOTHERMAN, S. SALLEY, A. BAIRD, J. CALLAHAN & N. WISDOM. BDAE Complex Ideational Material as an Indicator of Performance Validity in NFL BAP Neuropsychological Assessments.
Objective: The BDAE Complex Ideational Material (BDAE) is a 12-item comprehension task assessing receptive language; however, recent research has demonstrated its utility as a measure of performance validity in neuropsychological assessments, with

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a score ≤ 9 posited as a conservative cutoff indicative of feigned impairment (Erdodi et al., 2016). This study sought to extend existing literature on the BDAE as a Performance Validity Test (PVT) through examination of BDAE scores in a sample of retired NFL players within a forensic setting. It was hypothesized that analysis of obtained BDAE scores at or below the aforementioned cutoff would accurately categorize participants in accordance with Slick (1999) criteria.
Participants and Methods: Participants included 140 retired NFL players referred for a neuropsychological evaluation as a part of the NFL Players' Concussion Settlement. The sample is composed of 33 Caucasian and 107 African American males born between 1931 and 1989. BDAE scores were used to classify players into credible and non-credible categories, which were cross-checked with diagnostic classifications determined in accordance with the Slick (1999) criteria for malingering. Diagnostic classification statistics derived via ROC analysis were performed to determine the extent to which BDAE-mediated classifications aligned with Slick-mediated categories of non-malingering and malingering.
Results: Using a cutoff score of ≤8, the BDAE demonstrated adequate diagnostic classification statistics for players categorized as malingering via Slick criteria (ROC: sensitivity = 0.52, specificity = 0.89; AUC = 0.84, 95% confidence interval: 0.76-0.91, p<.001).
Conclusions: In contrast to Erdodi et al. (2016), findings from this study support the use of a more conservative cutoff score (< 8) to minimize the rate of false positives during medicolegal evaluations. Future studies should examine the use of the BDAE as a validity test in populations with known neurological conditions.
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L. SORGE, M. LIBBEN & D. LEITNER. Use of Eye Tracking During the Wisconsin Card Sorting Test as an Intrinsic Test of Effort.
Objective: To mitigate the risk of malingering invalidating neuropsychological test scores, the current study aimed to determine if eye-tracking measures of cognitive load can be used as an intrinsic test of effort on the computerized version of the most common test of executive function, the Wisconsin Card Sort Test (cWCST; Psychological Assessment Resources [PAR], 2007). Previous research has shown that pupil size, fixation duration, and saccadic velocity increases when the amount of cognitive load is increased, while blink frequency and fixation frequency decreases (Goldberg & Wichansky, 2003; Kahneman & Beatty, 1966). Therefore, these may serve as an objective measure of effort during neuropsychological testing. We predicted that putting forward one's best effort would show increased cognitive load, as per the eye-tracking measures, compared to faking one's performance.
Participants and Methods: Forty-six undergraduate students were randomly assigned to one of two conditions: a control condition ("Best Effort"), and a simulated malingering condition ("Faking Bad"). The participants in the Best Effort condition were instructed to complete the cWCST to the best of their ability. The participants in the Faking Bad group were instructed to intentionally try to achieve poor results on the cWCST, simulating cognitive impairment, without being detected. Once they were administered the cWCST, various eye-tracking measures were recorded.
Results: Results showed that the eye-tracking measures did not differ between conditions (all p values > .05), which suggests that they may not be a valid method of detecting malingering on the cWCST.
Conclusions: The averaged eye-tracking measures used in this study may not be the best method to detect malingering on the cWCST. However, this study may be used as a stepping-stone to further eye-tracking methods of malingering detection. Future studies may consider alternative approaches in use eye-tracking to detect malingering during neuropsychological assessments.
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J. SUHR, G. HENRY, R. HEILBRONNER & D. DRANE. The Relationship of Cogniphobia to Symptom Validity and Performance Validity in Neuropsychological Evaluations.
Objective: Cogniphobia, belief that engaging in cognitively effortful activity could exacerbate a neurological condition, was recently shown to predict performance validity (Henry et al., 2018). In the present study, we further examined Cogniphobia and assessed its relationship to the Minnesota Multiphasic Personality Inventory – 2 Restructured Format (MMPI-2-RF) and to performance on standalone performance validity tests (PVTs).
Participants and Methods: 171 participants from a multi-site study who received neuropsychological evaluations, including 103 with external gain and 68 without clear external gain, completed a measure of Cogniphobia, the MMPI-2-RF, and the Word Memory Test; a subset also completed the Test of Memory Malingering.
Results: Principal Components Analysis of Cogniphobia items was consistent with prior work and identified two factors, Dangerousness and Avoidance, which correlated moderately (r=.34). Cluster Analysis revealed that participants clustered into 4 groups: low on both factors (LB; N=47), high only on Dangerousness (HD; N=54), high only on Avoidance (HA, N=40), and high on both factors (HB, N=30). After removing individuals with invalid VRIN/TRIN, HB scored significantly higher than all other groups on all MMPI-2-RF overreporting scales, and HA was also higher than LB on 3 overreporting scales and than HD on 1. After removing all MMPI-2-RF profiles with overreporting invalidity, HB scored significantly higher on Revised Clinical scales 1, 3, 6, and 8. Finally, HB and HA were more likely to fail PVTs than the other two groups.
Conclusions: Results suggest that the Avoidance component is most strongly related to responding invalidly on self-report measures and in performing noncredibly on PVTs. Even when controlling for symptom validity, individuals high on both Cogniphobia components report high clinical symptoms, in the domains of depression, somatization, paranoia/cynicism, and thought dysfunction. Results further support a role for Cogniphobia in noncredible neuropsychological presentations.
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S. TAYLOR, J.D. BEACH, S. ISAAC, S.L. AITA, M.N. HARRELL, A. BOETTCHER, J. EPKER & B. HILL. On the Cusp of Failure: Exploration of Borderline PVT Performance in a Chronic Pain Sample.
Objective: This study evaluated Dot Counting Test (DCT), WASI FSIQ, RBANS Total Score, and Pain Catastrophizing Scale (PCS) performance of subjects scoring within 1%, 3%, and 5% of the cut score indicating valid performance on the Word Memory Test (WMT) in a chronic pain sample.
Participants and Methods: 459 subjects (M age=53.32, SD=13.55; M education=13.10, SD=2.66; 61% female; 81% White, 12% African American, 0.6% Other) presenting for a pre-surgical evaluation at a Southeastern pain clinic completed the WMT, DCT, RBANS, WASI, and the PCS as part of a larger battery.
Results: Chi-squared tests of independence were used to analyze the passing rates of the WMT passed, failed, and cusp groups on DCT. All chi-squared models were significant [c^2 (2, N=458) = 49.50, p=<.001; c^2 (2, N=458) = 55.52, p=<.001; c^2 (2, N=456) = 57.74, p=<.001 for 1%, 3%, and 5% cusp groups, respectively]. Kruskal-Wallis One-Way ANOVA was used to analyze the differentiation of medians for the WASI FSIQ, RBANS total score, and PCS across WMT passing, failing, and cusp groups. All ANOVA models were significant for the WASI FSIQ [c^2(2, N=459)=62.15, p<.001; c^2(2, N=459)=69.47, p<.001; c^2(2, N=457)=72.04, p<.001], RBANS total score [c^2(2, N=459)=84.66, p<.001; c^2(2, N=459)=101.38, p<.001; c^2(2, N=457)=103.57, p<.001], and PCS [c^2(2, N=459)=11.87, p<.001; c^2(2, N=459)=15.25, p<.001;

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$c^2(2, N=457)=18.21, p<.001$]. Mann-Whitney U Post-Hoc Analyses with Bonferroni correction of .016 were used to perform pair-wise comparisons across WMT groups.
Conclusions: The difference in DCT pass rates across WMT passed, cusp, and failed groups increased as cusp group size increased from 1% to 3% to 5% around the WMT cut score. The 5% cusp group had significantly different WASI and RBANS scores from both passed and failed groups. Future research should further evaluate borderline PVT performance in clinical and non-clinical samples.
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E.M. VOGT, K.A. RITCHIE, D.E. MARRA, M.E. NITTA, J. KOOP & J. HOELZLE. Performance Validity Cut-Off Scores for the Automatized Sequences Task in a Mixed Clinical Pediatric Sample.
Objective: This project aimed to evaluate the Automatized Sequences Task (AST) validity measure for children and adolescents with varied clinical conditions.
Participants and Methods: Community recruited children and adolescents [$N = 66$, $M_{age} = 10.54$ (2.80)] completed the AST in addition to other neuropsychological measures. Youth with pre-morbid diagnoses [$n = 23$, M_{age} 10.25(2.52)] completed measures according to manual instructions, whereas, some community-recruited youth were instructed to put forth best effort [$n = 23$, M_{age} 9.82(2.10)], or simulate cognitive impairment [$n = 20$, M_{age} 11.72(2.62)].
Results: When previously established AST cut-off scores from a pediatric mild Traumatic Brain Injury sample were investigated, there was a high rate of false positive invalid identification for control (14-23%), clinical (22-48%), and young (< 10 yrs 22-41%) participants. Thus, more appropriate cut-off scores were sought. Receiver operator curve (ROC) analyses and area under the curve (AUC) discrimination values were generally similar in both control (Alphabet .79, Counting .85, Days of Week .82) and clinical participants (Alphabet .75, Counting . 78, Days of Week .76), except in the Months of the Year condition (control .76, clinical .56). This affected AUC for the Total Time (control .81, clinical .68) thus, a Revised Total Score was generated. Recommended cut-scores were determined to optimize specificity (Time in seconds; Alphabet ≥ 19, Counting ≥ 8, Days of Week ≥ 6, Months of the Year ≥ 22, Total Time ≥ 52, Revised Total Time ≥ 38) with resulting moderate sensitivity.
Conclusions: This is the first study to recommend empirically derived AST cut-off scores for youth with varied clinical conditions. Suggested AST cut-off scores for both control and clinical groups are more conservative for this sample than previous empirical scores from a pediatric mTBI sample; however, classification statistics appear promising. Additional findings and clinical implications will be presented.
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E.R. WALLACE, K.C. BALTHROP, S.L. BROTHERS, T. BORGER, N.E. GARCIA-WILLINGHAM, B.D. WALLS & D.T. R. BERRY. Conners' Adult ADHD Rating Scales–Self-Report: Long Version Infrequency Index Validation and Pilot Comparison of Administration Formats.
Objective: Although ADHD malingering is relatively prevalent on college campuses, many symptom self-report measures do not contain validity scales. In response, the Infrequency Index (CII) for the Conners' Adult ADHD Rating Scale–Self-Report: Long Version (CAARS-S:L) was developed, although further validation is needed. Another topic of interest in ADHD malingering research is the increasing use of online assessments, although little is known about how ADHD is malingered online. This study aimed to provide further validation of the CII as a malingering indicator for the CAARS-S:L and provide initial results on comparability of the paper and online forms of the assessment.
Participants and Methods: This study utilized a coached simulation design with three groups of college students at the University of Kentucky ($n = 27$ with ADHD diagnoses verified by structured interview; $n = 46$ nonclinical responding honestly; $n = 66$ nonclinical instructed to feign). Participants were randomly assigned to complete the CAARS-S:L on paper or online.
Results: Welch ANOVA and Games-Howell follow-up contrasts identified group differences. Students with ADHD and students instructed to feign produced statistically comparable elevations on seven of eight CAARS-S:L clinical scales. The CII demonstrated modest sensitivity (0.36) and adequate specificity (0.85) at the recommended cut score across administration formats. Specificity reached desirable levels (>= .90) at a raised cut score. These values were statistically similar across administration formats.
Conclusions: Consistent with extant literature, students instructed to feign ADHD produced clinical scale scores similar to those diagnosed with ADHD on paper and online forms. Further, the CII performed similarly across formats, providing initial evidence that medium does not significantly affect CAARS clinical scale scores or the ability to detect feigning. The CII's ability to identify malingerers, particularly at raised cut scores, supports its use, although further validation is needed.
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Other

A. GRANT, J. LACE, C. TEAGUE, A. GARNER, P. RUPPERT & J. GFELLER. Symptom Validity Tests in College Students Feigning ADHD versus Depression and Anxiety.
Objective: Feigned or exaggerated symptom reporting on Symptom Validity Tests (SVTs) is common in those seeking an attention-deficit/hyperactivity disorder diagnosis (ADHD; Sullivan et al., 2007). Additionally, inattentive symptomatology in ADHD overlaps with symptoms seen with anxiety and/or depression. Therefore examining feigned symptom presentation in these frequently comorbid conditions merits investigation. Standalone and embedded SVTs were administered to identify differences in symptom presentation and to determine the classification accuracy of previously identified SVT indicators.
Participants and Methods: Participants were 75 undergraduate Saint Louis University psychology students ranging from 18-26 years old with most participants being White (76%) females (61%). As part of a larger study, participants were randomly assigned to one of three groups: 1) coached to feign ADHD symptoms (ADHD); 2) coached to feign symptoms of depression and anxiety (DA); and 3) optimal effort control (OC). Symptom validity was assessed using the Conners Adult ADHD Rating Scale - Infrequency Index (CII) and the Structured Inventory of Malingered Symptomatology (SIMS).
Results: The ADHD group reported more symptoms of inattention, hyperactivity, impulsivity relative to the other two groups. In contrast, the DA group reported more problems with low self-concept, depression, and anxiety. Sensitivities ranged from .22 to .36. Results indicated the SIMS was the most effective indicator for detecting the ADHD and DA groups, with the highest sensitivity (36%) and specificity rates (100%).
Conclusions: Overall, persons feigning mood symptoms exhibited different symptom profiles than the ADHD group and elevated emotional symptoms relative to the control group as expected. However, a pattern of low sensitivity was found with the SVT cut-off scores used in the present study. Thus, multiple measures of response bias and effort should be used to assess for feigned symptomatology or deficits during neurocognitive testing.
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Assessment/Psychometrics/Methods (Adult)

Y. GOVEROVER, S. ROTENBERG, M.C. BAUM & N.D. CHIARAVALLOTI. Measuring Changes in Activity Participation of Persons with Cognitive Impairments: Use of the Activity Card Sort Test.

Changes in level of activity participation related to cognitive impairments following neurological illness/injury or as a result of ageing are common. However, there is little agreement regarding measurement of participation. Common measures of participation often use a short list of specified activities that focus on frequency of participation in various activities of daily living. However, measuring frequency of participation in diverse activities such as household/car maintenance and making phone calls may not mean much on an individual level if levels of activity participation are not compared to how it used to be before injury, or illness. Thus, use of a short list of specified activities risks inaccurate representation of overall levels of participation. The Activity Card Sort (ACS) differs from existing assessments because (a) it consists of labelled photographs of adults participating in various activities, including social and leisure activities and (b) it considers retained levels of participation over extended periods of time by requesting persons to sort the photographs into categories to reflect their previous and current participation. This symposium will present and describe the ACS conceptual framework, and it's psychometric properties. The specific objectives are to describe: (i) The ACS convergent and construct validity is able to detect a known relationship between activity participation and quality of life (convergent construct validity); (ii) is able to discriminate between various groups who are known to have different levels of activity participation, including traumatic brain injury, multiple sclerosis and older adults with subjective cognitive decline (discriminative construct validity); and (iii) can be administered remotely by using new technological advances. A discussion about inclusion of measures of activity participation in research and practice will conclude this presentation.

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Y. GOVEROVER, J. LENGENFELDER & N.D. CHIARAVALLOTI. Changes in Activity Participation Following Multiple Sclerosis and Traumatic Brain Injury.

Objectives: Traumatic Brain Injury (TBI) and Multiple sclerosis (MS) result in impairments in cognitive and motor skills, which may reduce their level of activity participation. This study compares past and current levels of activity participation in persons with MS, TBI and healthy adults. The relationship between retained activity participation (since diagnosis or injury) and cognitive, motor, functional status, and depressive symptomatology was examined.

Methods: Twenty-seven (27) individuals with MS and 52 individuals with TBI living in the community and 21 healthy controls (HC) completed cognitive and motor tests and rated their activity participation (using the Activity Card Sort test), depressive symptomatology, and functional status.

Results: Participants with MS and TBI reported significantly lower current activity participation than HC participants. Percent retained activity participation (from pre-diagnosis to current) in MS correlated with time since diagnosis, executive function and motor skill ability, depressive symptomatology and current functional status. In persons with TBI, percent retained activity participation was significantly related to age, and quality of life.

Conclusions: Persons with TBI and MS report negative changes in activity participation in most aspects of life following diagnosis or injury. These findings call attention to changes in activity participation that are directly related to MS and TBI symptomatology.

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Aging

S. ROTENBERG, A. MAEIR & D.R. DAWSON. Older Adults with Subjective and/or Objective Cognitive Decline: Relationship with Participation in Daily Activities.

Many older adults report cognitive problems with or without objective cognitive impairment: the implications on daily functioning require investigation.

Objective: To examine: (1) levels of participation in daily activities of older adults reporting cognitive problems; (2) the validity of the Activity Card Sort (ACS) in distinguishing between older adults with subjective cognitive decline (SCD) and those with objective cognitive impairment; and (3) the relationship of activity participation with quality of life (QoL).

Participants and Methods: 115 older adults (60+) were divided into three groups: (1) SCD (Montreal Cognitive Assessment (MoCA)≥ 26; n=66); (2) mild cognitive impairment (MoCA=20-25; n=34); and (3) severe cognitive impairment (MoCA≤19; n=15). The ACS was used to measure participation in instrumental activities of daily living (IADLs), social and leisure activities, relative to individuals' past participation. The Short-Form Health Survey was used to assess QoL in 91/115 participants.

Results: The level of maintained participation was 79.4% (±13.5), 70.1% (±13.5) and 58.0% (±20.2) in people with SCD, mild and severe cognitive deficits, respectively. On the ACS, older adults with SCD reported significantly higher levels of participation in social activities and high-physical-demand leisure activities compared to people with mild or severe cognitive impairment. The SCD group reported significantly higher levels of participation in IADLs and low-physical-demand leisure activities compared to those with severe cognitive impairment only. QoL was higher among those with higher levels of participation measured on the ACS (r=.407-.619, p<.01).

Conclusions: Using the ACS, this study demonstrates differences in participation between older adults with SCD, mild and more severe cognitive impairment and supports the relationships between activity participation and QoL in older adults with SCD and/or objective cognitive impairment. Clinical implications will be discussed.

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Assessment/Psychometrics/Methods (Adult)

M.C. BAUM. Measuring Changes in Activity Participation of Persons with Cognitive Impairments: Use of the Activity Card Sort Test.

Objective: The Activity Card Sort (ACS) was developed to be a part of an assessment battery to record what people do, what they have given up and guide individuals to set goals to gain the skills or have environmental support to engage in meaningful activities. This study will describe activity disengagement among older adults living independently in a senior housing unit.

Participants and Methods: Fifty one adults over the age of 60 (42 females and 9 males) were administered the activity card sort and supplemental questions to specifically identify the challenges and opportunities to lay the foundation for an intervention to help older adults retain and reengage in activities to reduce the risk of disabilities and protect against cognitive decline and depressive symptoms known to be associated with sedentary activities and social isolation. None of the participants were receiving in-home supportive services.

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Results: Findings highlighted that many older adults have activity patterns that are not optimal for health. We also learned why people were giving up activities, what they would like to do again or more often. The puzzling finding was that people wanted to do things that were offered at the facility but they were not participating. This finding is leading to additional exploration.
Conclusion: The ACS provided quantitative and qualitative data to gain an understanding of the instrumental, leisure, fitness and social activities of the participants. An intervention program that uses self-management and action planning is being piloted to address the issues that the participants identified.
Other work stimulated by the study is to link the activities to Metabolic Equivalents (METs) and to identify engagement in cognitively demanding activities.
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Invited Symposium 1. Neurotechnology for Neuropsychology in Egypt, Nepal and Canada: Perspectives, Intersections and Opportunities

Chair: Judy Illes

Presenters: Tamer Emara, Alissa Antle, Claudia Barned

9:00–10:30 a.m.

J. ILLES, T. EMARA, A. ANTLE & C. BARNED. Neurotechnology for Neuropsychology in Egypt, Nepal and Canada: Perspectives, Intersections and Opportunities.
What is the potential for neurotechnology in neuropsychology? In this symposium we will explore the benefits and pitfalls of devices that can help people with neurologic and mental health disorders. In countries where healthcare resources are extremely limited, neurotechnology can prove particularly valuable, enabling virtual training, research and treatment, targeting many more people than a small number of medical professionals could otherwise reach. In developed countries, neurotechnology can enhance the care given to people with mental illness. But these new techniques raise important issues of policy, regulation, safety and efficacy, as well as social and ethical questions. For example, data acquisition and privacy; the potential for modulating the brain; cultural differences; technology design and marketing versus genuine healthcare needs. The speakers will give three very different perspectives on their experiences of using neurotechnology. A virtual hospital has been established in Egypt providing 'Treat and Teach' initiative programs in healthcare service development that extends to Arab countries and the African continent, saving time, effort and cost associated with traditional forms of teaching. Nepalese and Canadian children living in poverty who are traumatized by their experiences of domestic violence, abuse and neglect can learn to manage their anxiety using mobile devices. Transcranial stimulation and deep brain stimulation could help treat people globally with substance abuse, but there is still considerable uncertainty around this. With a focus on maximizing opportunities and benefits and minimizing the risks presented by neurotechnology, the panel will discuss the intersecting roles of neuropsychologists, ethicists, neuroscientists, engineers, clinicians and patients to encourage and inspire research and dialogue on the responsible use of advances in brain science.
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T. EMARA. Teleneurology Courses Connecting African and Arab Countries: The Treat and Teach Initiative.
With a population of 1.2 billion, and only 3% of the global healthcare workforce, there is a dire need to improve the number of qualified healthcare workers in Africa. This problem is greater in neurology due to the ageing population accounting to 20-25% of cases presenting to the ER, and management difficulties. With 85% of stroke deaths occurring in LMIC, DALY lost due to stroke are seven times more than in high income countries, and rehab services are offered to 3% of the stroke population, highlighting the deficiency in specialists. Also, 90% of epilepsy cases occur in the developing world. There is a lack of training programs in most Sub-Saharan African countries. Most neurologists are trained abroad and many of them do not go back to their home countries.
Ain Shams University Virtual Hospital was established as an institutional outreach program for healthcare service development. It operates via a 'Treat and Teach' initiative serving Egypt, Arab countries and the African continent. It aims to provide equitable health care to the region in a sustainable model. The service is offered through a package which is customizable, priority based, blended, and timed with tangible outcomes. It offers medical consultation services to remote areas that are deficient in specialists. In parallel, it provides applied health education for health professionals to train competent local champions who can independently operate some health services. It benefits from the advantages of novel ICT in saving time, effort and cost and delivering data in innovative techniques. The vision is to establish a knowledge hub where international and regional experts can meet to help patients and students in less served areas. We will discuss our experiences in the last few years in working at different levels of complexity with different healthcare providers in Egypt and Africa.
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A. ANTLE. Ethics, What Ethics? Developing a Wearable Brain-Computer App for Children Living in Poverty In Nepal and Canada.
Anxiety disorders affect more than 15% of children in Canada and the USA, often lasting into adulthood. Children living in poverty are at increased risk due to their exposure to trauma. Research suggests that learning to self-regulate anxiety early in life is beneficial and may reduce the negative impact of mental health challenges for children, teens and adults. Best clinical practices in industrial nations have shown the benefits of pairing body-based with cognitive therapeutic approaches, such as neurofeedback.
Our research team developed an early stage prototype mental health software application for children and their caregivers, called the MindFull system. Composed of neurofeedback games that ran on mobile devices and an inexpensive EEG-headset (Neurosky). It was designed for counsellors to help children learn how to self-regulate anxiety in their everyday lives. The games enabled the children to experience feeling calm, relaxed and focused.
Our first system and study was developed to help Nepalese children living in poverty who had multi-layered trauma due to exposure to domestic violence, parental drug and alcohol addiction, sexual and physical abuse, neglect and civil war. Our second system and study aimed to help multi-cultural Canadian children at risk for anxiety disorders in a lower socio-economic-status area of an urban city. Results showed that after 18-24 one-on-one sessions with a trained counsellor, most children (aged 5 to 11) were able to learn and practice self-regulation of anxiety in their everyday lives.
This research raises important ethical questions: can we uniformly transfer mental health models from one culture to another or does doing so introduce other forms of harm? How to we ensure our research designs balance rigor with providing benefit to children whose needs may vary widely? As researchers, what is our obligation to the long-term mental health of these populations?
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C. BARNED. Addiction, Neurotechnology and Culture.
Addiction has been a topic of concern for many countries in the last ten years. In North America, prevalence rates of those diagnosed with a substance use disorder have skyrocketed. For example, in Canada, with a population of over 35 million, 6 million were diagnosed with a substance use disorder in 2013. Recent developments in neuroscience promise to improve the lived experiences of those with an addiction by helping in abstinence and treatment efforts. Neurotechnology in the context of addiction is often represented by pharmacological treatments and other medical technology targeting the neurobiology of addiction. Over the years, we have seen a drastic development in the types of neurotechnology marketed for the treatment of addiction. For example, non-invasive versus invasive technology, i.e., transcranical direct current stimulation (tDCS) versus deep brain stimulation (DBS). "Addiction neuroethics" has emerged as an interdisciplinary response to important ethical dilemmas associated with addiction research, neurotechnology, health care delivery, and policy. This presentation outlines the ethical, legal and social implications of specific neurotechnologies, i.e., tDCS and DBS; we draw particular attention to key challenges associated with the early arrival of such technologies on the market, more specifically, safety and efficacy aspects. This presentation will demonstrate why it is so important for psychologists to engage with neuroscientists, clinicians and patients to encourage and inspire research and dialogue on the responsible use of advances in brain science.
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Paper Session 1. Aging & Sociodemographic Factors

Moderator: Duke Han

9:00–10:30 a.m.

M. FARRELL, L. KOBAYASHI, R. WAGNER, N. DEMEYERE, M. DUTA, L. MONTANA & L. BERKMAN. Gender Disparity in Educational Attainment Mostly Explains Cognitive Gender Differences in Older Rural South Africans.
Objective: International studies examining gender gaps in late-life cognition have shown that the direction and magnitude of gender differences are inextricably tied to sociocultural context. Our study evaluates cognitive gender differences in rural South Africa, and explores educational access as a primary driver of inequality in late-life cognition.
Participants and Methods: We analyzed data from 2,106 participants aged 40-79 from the Health and Aging in Africa Study, based in Agincourt, South Africa. Cognitive function was measured via the Oxford Cognitive Screen, designed for low-literacy settings. Confirmatory Factor Analysis derived 4 domains: episodic memory (EM), executive function (EF), visuospatial ability (VS), and semantic knowledge (SK). Structural equation models tested for gender effects in each domain, incrementally controlling for 1) demographic factors: age, country of origin, and marital status, 2) education: years of education, self-rated literacy, 3) wealth: asset index, and 4) health: sum of conditions (cancer, hypertension, stroke, diabetes, malaria), HIV, physical function, self-rated health, and depressive symptoms.
Results: Women were younger and less educated, and were more likely to be unmarried, illiterate, to have had cancer, and to have been born outside of South Africa. In the base model, women outperformed men on EM, while a male advantage was observed for all other cognitive domains. Adjusting for demographic, health, and wealth factors did not significantly alter the pattern or magnitude of gender effects. Adjusting for education and literacy nearly doubled the female advantage on EM, and eliminated or reduced the male advantage on other domains.
Conclusions: In this large South African cohort, gender inequality in older adults' cognitive performance was largely attributable to educational differences. Understanding the biopsychosocial mechanisms that promote cognitive resilience in older women is of utmost importance given the disproportionately female distribution of aging populations.
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L. KAMALYAN, L. ABREU, E. KULICK, J. AVILA, A. KIND, A.M. BRICKMAN, N. SCHUPF & J.J. MANLY. Effect of Neighborhood Disadvantage Level on Cognitive Trajectory Among Diverse Older Adults.
Objective: Both individual and neighborhood socioeconomic status (SES) are related to cognitive function. However, most prior research is cross-sectional and lacks comprehensive cognitive measures. We hypothesized that block-level neighborhood disadvantage, by the Area Deprivation Index (ADI) - a contextual measure of neighborhood SES, would predict neuropsychological trajectory after adjustment for individual SES, and that living in a less disadvantaged neighborhood would not be as beneficial for Latinos and Blacks as compared to Whites.
Participants and Methods: Participants were 1318 non-Hispanic White, 1600 non-Hispanic Black, and 2283 Hispanic participants in a community-based study of aging and dementia, age 65+ (67.1% women) and dementia-free at baseline. Home addresses were assigned a national block-group ADI score derived from 17 markers of income, education, employment, and housing quality collected by the U.S. Census, and the Neighborhood Atlas. Neuropsychological tests were administered at baseline and every 18–24 months. Latent growth curve models tested the relationship between neighborhood disadvantage and cognitive trajectory, adjusting for age, sex/gender, childhood SES, adult income, occupation, and years of education, and testing for moderation by race/ethnicity.
Results: Independent of covariates, higher neighborhood disadvantage predicted lower baseline language scores among Whites and Blacks, but not Hispanics. Neighborhood disadvantage predicted lower visuospatial performance across race/ethnicity, with a stronger negative effect on Blacks and Hispanics than among Whites. Among Whites only, higher neighborhood disadvantage predicted less visuospatial decline over time ($p<.05$ for all). There was no effect on memory trajectory.
Conclusions: Older adults who live in more disadvantaged neighborhoods have lower baseline cognitive scores and these effects differ across race and ethnicity. Neighborhoods may be important social mechanisms underlying racial and ethnic disparities in late life brain health.
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J. CHEY, S. KWAK, H. KIM, W. JOO & Y. YOUM. Social Network Properties and Neurocognitive Health in Later Life: Findings from the Korean Social Life, Health, and Aging Project (KSHAP).
Objective: An overview of the KSHAP study, including the relations among complete social network properties, health, and cognitive function in Korean older adults, will be followed by a series of studies that examined the relationship between social network property and brain aging by 1) investigating the specific properties of social network that protect against brain aging, and 2) delineating how specific social network property may moderate the relation between brain aging and cognitive decline.
Participants and Methods: We recruited 835 elderly dwelling in the Township K, and administered social network questionnaires, which involved asking the participants to generate the name of people who have regular contact and discuss important concerns with him/her. From this global network, a variety of social network characteristics were generated, including network size, embeddedness, and degree of

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isolation. Sixty-eight healthy older adults (mean age = 71.38, SD = 6.40) were subsampled and completed T1, T2-FLAIR, and resting-state fMRI scan which were used to estimate the brain health as well as a neuropsychological battery.
Results: Measures of social network characteristics, such as, in-degree centrality and embeddedness were associated with healthier brain functions, such as larger gray matter volumes including amygdala, stronger long-distance functional connectivity, and attenuated effects of white matter hyperinstensities on executive function. These social network properties were also able to moderate the deleterious effects of depression on cognitive functions, such as long-term memory function.
Conclusions: The KSHAP study found evidence that social integration property of social network rather than network size has protective effects against brain aging and neuropsychiatric pathologies on cognitive functions.
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J.F. AVILA, S. VERNEY, K. WITKIEWITZ, J. VONK, M. ARCE RENTERÍA, N. SCHUPF, R. MAYEUX & J.J. MANLY. Interactions Between Sex/Gender and Race/Ethnicity on Cognitive Trajectories and Dementia.
Objective: We determined whether cognitive trajectories differ between men and women across and within racial/ethnic groups and identified potential socio-cultural mediators of these differences.
Participants and Methods: Participants were 5258 non-Hispanic White (NHW), Black, and Hispanic men and women in a longitudinal study of aging and dementia, age 65+ and not demented at baseline. Neuropsychological tests were administered at baseline and every 18–24 months. Multiple-group latent growth curve modeling examined trajectories across sex/gender by race/ethnicity and by socio-cultural factors, including early childhood socioeconomic position, years of education, adult income and occupation, and marital status. Cox regression estimated risk of incident dementia.
Results: The largest baseline differences were between NHW men and Hispanic women on visuo-spatial (d = 1.59; CI = 0.72, 0.82) and language (d = 1.44; CI = 0.82, 0.96) composite scores, and between NHW women and Hispanic men on memory (d = 1.11; CI = 0.57, 0.70). Black women had significantly steeper rates of decline compared to NHW women in memory (d = 0.31, CI = 0.003, 0.03) and visuo-spatial (d = 0.52, CI = 0.003, 0.02) domains. Education and higher adult income predicted higher baseline scores and lower risk of dementia conversion across groups. After accounting for adult SES factors, higher early life SES was positively associated with initial performance for Black men and rate of decline for NHW men. Among NHW women, being married was protective against memory decline (slope). Blacks and Hispanics were at higher risk of incident dementia than Whites, but there was no main effect of sex/gender or interaction.
Conclusions: Sex/gender differences in cognitive trajectory vary as a function of race/ethnicity, as does the contribution socio-cultural mediators of risk for cognitive decline and dementia. Future research should further examine biological and socio-cultural mechanisms that explain these differences.
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E.A. BOOTS, K.J. CASTELLANOS, L. ZHAN, L.L. BARNES, L. TUSSING-HUMPHREYS & M. LAMAR. Racial Differences in Inflammation, Cognition, and Structural Connectomics: A Preliminary Study.
Objective: Chronic inflammation is implicated in Alzheimer's disease (AD) and cardiovascular disease (CVD). Non-Latino Blacks have greater risk for AD than non-Latino Whites, likely due to factors disproportionately affecting Blacks such as CVD. Further, cognition in Blacks is differentially impacted by chronic inflammation compared to Whites, yet little work has examined the neurobiology of these differences. We examined racial differences related to inflammation, cognition, and structural connectivity in non-demented older Blacks and Whites.
Participants and Methods: 71 participants (age=69; 47% male; Black n=34) underwent fasting venipuncture, cognitive evaluation, and MRI. Serum was assayed for IL-6. PCA of cognitive variables resulted in three rotated factor scores: memory (CVLT-II Trial 1-5 Total, Delayed Free Recall, Recognition Discriminability); executive function (EF; FAS, Trail Making Test (TMT) B-A, Letter-Number Sequencing, Matrix Reasoning); attention/information processing (TMT-A, TMT-M, Digit Symbol). Graph theory analysis integrated T1-derived AD gray matter regions of interest and DTI-derived white matter probabilistic tractography into connectivity matrices that were analyzed for local measures of efficiency and centrality.
Results: Blacks and Whites did not differ on age, sex, or CVD risk (p's>.2), however, Blacks had lower word reading (p<.001). IL-6 levels associated with lower EF in Blacks but not Whites (p=.04). Higher IL-6 levels associated with lower supramarginal gyrus centrality and lower superior frontal gyrus (SFG) and thalamic efficiency in Blacks (p's<.02); IL-6 inversely associated with centrality in the cingulate, thalamus, entorhinal cortex, and SFG and efficiency in the SFG and accumbens in Whites (p's<.04).
Conclusions: Inflammation negatively impacts structural connectivity and cognition, but these relationships differ by race. Disparities such as psychosocial stress levels may contribute to differential associations between inflammation and brain-behavior in older Blacks and Whites.
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E.Z. GAMMADA, I.K. AVILDSEN, A. KULKARNI, A. SHEHAB, L. GIBBONS, P.K. CRANE, A.M. BRICKMAN & N.S. FOLDI. Sex Differences in Serial Position Effects Inform the Paradoxical Verbal Memory Advantage of Women with MCI.
Objective: Incidence of Alzheimer Disease (AD) is disproportionately higher in women, but paradoxically, that of Mild Cognitive Impairment (MCI) is higher in men. Sundermann et al. (2016) suggest that women's verbal advantage across the lifespan reflects better generic premorbid skills, which then require more neurodegeneration to manifest early clinical impairment. To date, sex differences in verbal memory have used total list scores. In the current study, we propose that qualitative examination of serial position effects (SPE) of list-learning can refine the source of sex differences. We hypothesize that women will benefit from list positions that can recruit deep more than shallow processing.
Participants and Methods: Participants included two ***Groups*** (healthy controls, HC, *N*=200; individuals diagnosed with MCI, *N*=353) of the Alzheimer's Disease Neuroimaging Initiative Phase 1 (ADNI-1), divided by ***Sex*** (men, women). Rey Auditory Verbal Learning Test (RAVLT-A) at study entry yielded ***SPE*** accuracy (Primacy, Middle and Recency positions) at three ***Time Points***: Trials 1-5 (TR15), Short Delay (SD), and Long Delay (LD). Three multivariate linear regressions at each Time Point examined SPE accuracy predicted by Group and Sex, controlling for APOE-4 and Education.
Results: As expected, Group was a significant predictor (HC > MCI) at each Time Point. Importantly, Sex (women > men) was a significant predictor. Women maintained their recall advantage for Primacy items (TR15 & SD, $p < .05$), and interestingly, for Middle items at all Time Points (TR15 & SD, $p < .05$; LD, $p < .001$).
Conclusions: Our data newly suggest that learning and retrieval of Middle SPE items capture a source of the sex advantage of list learning. Women's better learning and recall of these 'harder' list items may engage mnemonic, linguistic, and executive mechanisms that tap multiple distributed neural regions, which are implicated in deep processing. This, in turn, could mask early disease processes that are subserved by focal brain regions known to be impaired in AD.

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Symposium 1. Clinically and Empirically Informed Approaches to Functional Brain Mapping in Under-Represented Populations with Epilepsy: An Intradisciplinary Bio-Psycho-Social Model

Chair: Heidi A. Bender

Presenters: Marla Hamberger, David Sabsevitz, Saadi Ghatan, Jessica Spat-Lemus

9:00–10:30 a.m.

H.A. BENDER, M.J. HAMBERGER, D. SABSEVITZ, S. GHATAN & J. SPAT-LEMUS. Biopsychosocial Considerations in the Functional Brain Mapping of Epilepsy Patients: An Intradisciplinary Approach.

The demographic landscape of the United States is diversifying at a faster rate than culturally-appropriate and psychometrically-sound interventions and procedures can be validated. Thus, multiple populations with characteristics different from those historically referred for mapping: lower SES/educational attainments, broadened age range, physically disabled, and non-U.S.-born, non-native English-speakers, are at increased vulnerability for adverse neurocognitive outcome. Given this clear public health concern, there has been an increased emphasis on conducting research to focus, develop and implement interventions aimed at reducing this gap in service delivery. More specifically, owing to its critical role in high-stakes decision making, close collaboration across intra-disciplinary specializations within neuropsychology (i.e., research, clinical, technological and cross-cultural) is highly warranted in order to facilitate improved quality of care focused on historically-under-studied and under-represented populations receiving intra-/extra-operative mapping for epilepsy surgical planning. This symposium will discuss viewpoints from each of these perspectives in order to formulate a more cohesive strategy for addressing bio-psycho-social differences at the levels of task conceptualization, development, administration, clinical interpretation, validation and publication. Commentary on this multi-faceted view of mapping will also be shared from the 'other side of the drape,' by a neurosurgeon specializing in the treatment of pharmacoresistent epilepsy. Illustrative case studies will be critically reviewed and evaluated for the purposes of setting gold standards for functional brain mapping and to reduce the risk of neuropsychological morbidity. The need for a tailored, customized approach is clear; however, equally as is the critical balance of rigorous standardization procedures which is the bedrock upon which the neuropsychological sciences are built..

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M. HAMBERGER, D. SABSEVITZ, S. GHATAN, J. SPAT-LEMUS & H.A. BENDER. Considerations in Cortical Language Mapping in Epilepsy: A Review of Relevant Research.

The challenge of dominant-hemisphere epilepsy surgery is to remove a sufficient volume of epileptogenic cortex to eliminate seizures without compromising postoperative language function. Despite advances in neuroimaging techniques that identify areas of language-related activation, electrocortical stimulation mapping (ESM), a disruptive method, remains the gold standard for identification of "essential" language cortices. ESM relies on "negative" responses, in that stimulation of language cortex will disrupt task performance if the area stimulated is critical for the completion of a particular task. Epilepsy patients undergoing extra-operative and intra-operative mapping for surgical planning will be discussed. Given the reliance of ESM on task disruption, together with the functional specificity of language cortex, a two factor approach for effective and valid mapping will be explored. First, tasks must be sufficiently varied to capture potential language functions mediated by the region under investigation. Historically, visual object naming has been the most widely used ESM task. However, recent research has shown that visual naming fails to identify critical language areas that are elucidated by auditory verbal cues, and that removal of these areas results in significant language decline. Equally important, the level of the tasks utilized must be tailored to the individual patient with regard to the language spoken, their education and vocabulary level. That is, language errors that occur during stimulation must be directly attributable to this stimulation and not to baseline errors that would occur without it. In a break from the rigorous, validated, and normed testing approach that is a cornerstone of neuropsychology, the practice of ensuring flexibility in selecting mapping tasks which probe a reasonable range of language functions specific to each patient's surgical planning needs should be contextualized in a bio-psycho-social framework.

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D.S. SABSEVITZ, M.J. HAMBERGER, S. GHATAN, J. SPAT-LEMUS & H.A. BENDER. Cognitive Mapping During Awake Brain Surgery: The Need for Informed and Technologically-Novel Mapping Methods.

The ability to localize eloquent or functional brain regions during pre-surgical planning and surgical intervention is essential for risk assessment and optimizing outcome. Direct cortical stimulation (DCS) is the preferred method for surgical mapping and allows testing of not only the cortical surface, but also white matter tracts. The use of DCS in surgical planning is not a recent development and the methods for mapping higher cognitive functions, such as language, have remained relatively static in their development over the years with most surgical centers employing a "one size fits all" approach where automatic speech or naming pictures are used. Additionally, there is a paucity of paradigms to map non-language, eloquent regions. This presentation will discuss newly-developed technology that allows for more individualized, systematic and sophisticated mapping of cognitive functions and methods for mapping higher cognitive functions using an anatomically informed model for task selection. Epilepsy patients undergoing extra-operative and intra-operative mapping for surgical planning using a novel tablet based testing system will be included in this presentation. Results from surgical mapping using a novel, technologically-advanced, tablet-based testing system will be presented with specific focus on informed task selection and consideration of individual patient characteristics (premorbid ability level, language differences, etc.). Specific case examples will be used to illustrate main points.

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S. GHATAN, D. SABSEVITZ, M.J. HAMBERGER, J. SPAT-LEMUS & H.A. BENDER. Optimizing Intra-and Extra-Operative Brain Mapping Procedures in Collaboration With Neuropsychologists: A Neurosurgeon's Perspective.

Temporal lobe resections, including anterior temporal lobectomies, remain the most common surgical treatment for drug-resistant epilepsy. Neurosurgeons frequently rely on functional data yielded from brain mapping as a vital part of their surgical planning to strategically identify eloquent cortex. This procedure, designed to suppress cortical activity in order to functionally ablate the area and observe the subsequent

degree of disruption, is an important tool to maximize preservation of functioning following resective surgery. However, the clinical value of this technique is optimized when procedures are specifically tailored to a patient's unique neuroanatomy, as well as clinical, physical and demographic histories. This approach is key when assessing for change post-operatively and also for the duration of the mapping and its immediate findings. Specifically, consideration of the extent of residual impairments must be contextualized in terms of the patient's functioning in *their* culture, not merely in the "majority culture." As neurosurgeons, we depend on neuropsychologists to utilize available technology, clinical experience, and knowledge of the literature to conduct brain mapping that attempts to disentangle performance from the cultural milieu of the individual patient. Despite the need for comprehensive functional assessment intra-operatively, creating lengthy paradigms which are too detailed, can increase the risk of complications of a longer operation, as well as reduce a patient's overall endurance during an awake craniotomy. Over-simplification can result in resecting cortices critical for future cognitive and life functions. Therefore, balance is crucial. Neurosurgeons should work collaboratively with neuropsychologists to select appropriate tests during mapping aimed at improving precision of the resection and optimizing post-surgical functional and neurocognitive outcomes in even the most challenging, nuanced, and multifaceted cases.
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J. SPAT-LEMUS, D. SABSEVITZ, M.J. HAMBERGER, S. GHATAN & H.A. BENDER. Mapping the Melting Pot: Approaches from Clinical Cross-Cultural Neuropsychology.

Functional brain mapping is considered a vital part of the surgical planning process aimed at minimizing adverse neuropsychological consequences. Most commonly, mapping is used to identify eloquent cortex in expressive and receptive language areas, as well as structures related to sensorimotor functioning. While the success of brain mapping relies on the careful selection of tests based on putative cortical and subcortical networks and pre-operative neurocognitive assessments, equally as important is consideration of individual patient demographics. This is particularly evident in "special populations," such as those with reduced educational attainment, low SES, physical disabilities, and uncommon ages for this procedure (i.e., pediatric and geriatric). Membership within these groups carries their own unique experiences which have the potential to shape the functional distribution within neuroanatomical structures (e.g., shared and unique expressive language areas in bilinguals). For example, supplemental procedures should be considered when mapping territories within Heschl's gyrus due to its importance in pitch perception in patients who speak tonal languages, such as Thai, in which prosodic changes can confer different word meanings. In an English-language analogy, the difference between preSENT (a gift) vs. PREsent (a lecture) may have a dramatic impact on post-operative comprehension difficulties in the patient's dominant language. Despite the clear necessity for modified mapping procedures to suit the needs of individual patient-based considerations, a unified approach among neuropsychologists has yet to be agreed upon. Thus, the viability of coordinated research efforts and the development of gold-standard clinical practice guidelines is limited. Guiding, foundational principles with intra-disciplinary applicability throughout neuropsychology will be discussed.
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Symposium 2. Early Brain Injury and the Parent Experience: Unique Beginnings and Common Outcomes During the Early Years

Chair and Presenter: Tricia Williams

Presenters: Ashley Danguecan, Rachel Peterson, Samantha Roberts

9:00–10:30 a.m.

T. WILLIAMS, A. DANGUECAN, R. PETERSON & S. ROBERTS. Early Brain Injury and the Parent Experience: Unique Beginnings and Common Outcomes During the Early Years.

Historically, early brain injury was misunderstood as capable of implicit resilience given misattributions regarding neuroplasticity and the young brain's malleability (see Dennis, 2010). The pendulum has swung to better appreciating the extent and trajectory of impairment caused by early brain injury, particularly as the child grows up (Anderson et al., 2009; Elbers, DeVeber, Pontigon, & Moharir, 2013; Westmacott, Macgregor, Askalan, & Deveber, 2009). Among the largest medical groups with neonatal brain injury are hypoxia ischemic encephalopathy (HIE, affects 1-8/1000 live births), and neonatal stroke (1/4000 live births) (Kurinczuk, White-Koning, & Badawi, 2010; Lynch & Han, 2005). There is also increasing recognition of the impact of congenital heart disease on the developing brain and later neuropsychological and psychosocial issues. The importance of early identification of these issues has been emphasized by many consensus groups, recognizing the importance of supporting parents as a way of optimizing the child's development. In this paper symposium, three speakers will discuss the parent experience for each of these aforementioned early brain injury populations by outlining unique challenges around diagnosis and treatment, as well as common concerns and outcomes. Each will also identify parents' perceptions of children's strengths and how they relate to standardized assessment of development and well-being. Our final talk will address current needs of parents across these populations as well as identified gaps and barriers in current service delivery, considering transdiagnostic approaches to better care and follow-up for parents and children following early brain injury. Our discussant, Dr. Brenda Spiegler, provided consultation on this symposium, and provided mentorship and leadership across the development of each of the clinical research programs.
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A. DANGUECAN & R. SANANES. Congenital Heart Disease: The Impact of Parent Experience and Mental Health on Early Developmental Outcomes.

Survival is now the expectation for the majority of children with congenital heart disease, (CHD) yet, despite their increased medical success the risk of experiencing cognitive, socio-emotional, and behavioural issues remains largely unchanged for these children. A current emphasis is on addressing and promoting the well-being of parents and families (Marino et al., 2012, Woolf-King et al., 2017). The current mixed-method study examined parents' experiences at the time of diagnosis and treatment, their own current mental health, as well as subsequent perceived and objective measures of their child's early developmental outcomes using open-ended questions and standardized parent-ratings. Our sample included 48 parents of children with CHD (12 females), ranging in age between 6 months and 8 years with a mean age of two and a half years. Qualitative results based on a subsample (n=24) were organized around five themes: 1) They (medical team) saved my child's life, 2) My child is going to be okay, 3) We are not out of the woods yet, 4) Optimizing my child's outcome, and 5) There are still barriers that get in the way. Among the entire sample, parental stress and anxiety

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were strongly associated with the child's internalizing and externalizing symptoms at follow up (correlations range from .43 - .63, ps <.01). Parental depression was exclusively related to children's behavioural difficulties (r=0.61, p=.003). Parental mental health was unrelated to general developmental outcomes of the child. Directions for future research and family focused interventions will be discussed.
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R. PETERSON & R. WESTMACOTT. Parent Experiences and Developmental Outcomes following Neonatal Stroke: Areas of Optimism and Concern.
Stroke is a cerebrovascular event that can occur prior to or within the first days of life (perinatal) with an incidence rate of 1 in 1600 to 5000 births (Lynch, 2009). Cognitively, these children are at greater risk for intellectual disability and executive dysfunction including difficulties with working memory, attention, and information processing (Kolk, Ennok, Laugesaar, Kaldoja, & Talvik, 2011; Westmacott et al., 2018). Given higher rates of learning and cognitive difficulties, the current mixed-method study examined parents' experiences at the time of their child's stroke diagnosis, parents' current mental health, as well as subsequent perceived and objective measures of their child's early developmental outcomes using open-ended questions and standardized parent-ratings. The sample included 38 parents (32 mothers) of children with neonatal stroke (9 females), ranging in age from 6 months to 8 years (Mean age = 3 years, 2 months). Qualitative results revealed that many parents were optimistic about their child's functioning with 70% percent noting better outcomes than anticipated and 94% being very optimistic about their child's future development. A subset of these patients (n=9) participated in neuropsychological assessment (Mean age ~ 5 years of age, SD = 1 year, 4 months). During the diagnostic interview, parents expressed concerns with executive-based abilities such as poor emotional regulation (n = 6) and inattention (n= 4), which were already emerging at a relatively young age despite average performance on measures of intelligence and academics. The present study illustrates that parents are optimistic about their child's functioning following pediatric stroke, but are noting behavioral concerns that are emerging very early on that may not be discernable by age-appropriate neuropsychological measures, which has implications for clinical care and future intervention.
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S. ROBERTS & K. MCDONALD. Themes in Parent Experience and Outcomes of Children with Neonatal Hypoxic Ischemic Encephalopathy.
Among the largest medical groups with neonatal brain injury are hypoxic ischemic encephalopathy (HIE, affects 1-8/1000 live births (Kurinczuk, White-Koning, & Badawi, 2010). Prior studies have documented much diversity in outcomes, calling attention to challenges of neuropsychological skills as well as a growing emphasis on mental health outcomes (Marlow, Rose, Rands, & Draper, 2005). The current mixed-method study examined parents' experiences at the birth of their child and associated treatment, parental mental health, as well as subsequent perceived and objective measures of their child's early developmental outcomes using open-ended questions and standardized parent-ratings. Fifty-four parents (49 mothers) of children with HIE histories (24 females) were recruited. Child's age ranged from 6 months to 5 years, 5 months with a mean age of 1 year, 11 months. Approximately 50% of parents reported their child to be showing fewer challenges than anticipated and 46% were positive about their child's outcome. Qualitative results based on a subset of families of children ($n = 20$) were organized around six themes: 1) They (medical team) saved my child's life, 2) My child is going to be okay, 3) Uncertainty surrounding outcome, 4) Communication matters, 5) Family mental health and resiliency and 6) There are still barriers that get in the way. Among the entire cohort, standardized ratings of developmental and psychosocial outcome were generally within normal limits with approximately 10 percent of children at risk for poor developmental outcome.
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T. WILLIAMS & A. DANGUECAN. Intervention Experiences and Service Gaps following Early Brain Injury.
Parents experience intense distress learning that their 'normal' infant has suffered brain injury (e.g., Heringhaus et al., 2013, Bemister et al., 2014). There are many unique experiences in the early days around different treatments, but in the years following discharge there are also common risks and outcomes regarding the child's development. This study examined factors parents believe are important in optimizing their child's development following early brain injury, their current access to intervention, and future service needs. This study included 89 parents of children, ages 18 months to 8 years (Mean=3.5 years) with early brain injury associated with neonatal stroke, HIE and CHD (Ns = 28, 31, 30). Results from qualitative analysis identified common themes attributed to good outcomes including: regular medical monitoring and parent education on brain injury outcomes. The importance of early intervention was highlighted almost unanimously by most parents. 70% of children engaged in one or more therapies (Mean =2.5), with infant development and rehabilitation interventions being most commonly accessed. Across groups there were barriers that stood in parents' way of accessing service including logistical barriers (e.g., distance, high costs), service delivery gaps, and miscommunication during the referral process. Many parents described the importance of their own optimism and treating their child "like any other kid". Most parents rated the efficacy of these interventions highly, but some parents wanted more frequent service and reflected on the high cost of private services. 55% of parents were interested in understanding more about their child's brain injury and how to support their social-emotional development, as well as finding ways to promote their own confidence and coping as parents. These findings have the potential to help advocate for more comprehensive standard of care guidelines to optimize quality of life for children with early brain injury.
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Symposium 3. Evolution of the Concept of Performance Validity: from Malingering to Illness Behavior in the Clinical Context

Chair and Presenter: Jeroen Roor

Discussant: Roy P. Kessels

Presenters: Kyle Boone, Julie Suhr, Rudolf Ponds

9:00–10:30 a.m.

J. ROOR, K. BOONE, J. SUHR, R. PONDS & R.P. KESSELS. Evolution of the Concept of Performance Validity: from Malingering to Illness Behavior in the Clinical Context.
The validity of neuropsychological data – used as an umbrella term to describe both performance validity testing (PVT) and symptom validity testing (SVT) – is currently amongst the most researched topics in clinical neuropsychology. Initially, PVTs and SVTs were studied in forensic/litigation settings in the context of potential malingering. Research has shown that noncredible responding is also frequent in the clinical context

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and therefore PVTs and SVTs are considered a necessary component in every clinical neuropsychological assessment. This shift in scope of test validity is accompanied by alternative psychological explanations for noncredible performance and symptom reporting besides malingering. As such, engaging in noncredible responding might reinforce the patient's experience of symptoms. Therefore it is important to increase our knowledge of these psychological explanations for behavior management and potential treatment strategies.

In this symposium with four presentations of approximately 15 minutes each, we will start with an overview of noncredible performance in somatoform patients without motive to feign symptoms. Various explanations and interpretations for PVT failure in this patient population will be discussed. Next, psychological predictors of noncredible responding will be addressed, including their clinical implications for neuropsychological assessment, with a focus on cogniphobia in the context of broader illness beliefs. Despite its advocacy, little is known about the effects of providing feedback upon PVT failure directly to the patient. Recent study findings about the clinical impact of improvement on a repeated (and initially failed) PVT after feedback on treatment outcome will be discussed. Lastly, recent experimental findings and their implications are presented about the residual effects of intentional feigning on memory test performance and symptom reporting. The symposium will end with a 30-minute discussion led by the discussant.

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K. BOONE. Impact of Somatoform Symptomatology on PVT performance.

Research suggests that somatoform patients with no motive to feign have an increased rate of failure on PVTs involving processing speed. For example, Roberson et al. (2013) documented that credible patients (i.e., fail <=1 PVT across several) with somatoform diagnoses show a lowered specificity rate for the b Test E-score (47% false positive rate) when cut-offs were used that achieve high specificity (>=90%) in credible patients with other diagnoses. Similarly, McCaul et al. (2018) observed that 22% of credible patients with somatoform diagnoses exceeded the Dot Counting E-score cut-off, as compared to <=10% of credible patients with other diagnoses. Shouse (2012) found that somatoform patients who passed PVTs tended to endorse nonspecific cognitive symptoms involving mental "fogginess/spacy-ness" and reduced thinking speed, while noncredible patients failing PVTs reported failure to recall and use discrete, overlearned knowledge and skills (e.g., inability to recognize siren sounds or to recall how to put on glasses, difficulties in reading comprehension and writing, such as leaving out words), no benefit of cueing in memory recall, problems in multitasking and following sequenced steps, changes in speech, and dramatic changes in personality. The different patterns of symptom reporting are reminiscent of a "subcortical" versus "cortical" distinction described in neurologic patients. While somatoform patients have an increased rate of failure on PVTs involving processing speed, they still fail few PVTs overall across an exam. Kemp et al. (2008) reported that 30% of non-litigating neurology outpatients with medically unexplained symptoms failed a single PVT out of six administered, while 11% failed two or more; none scored significantly below chance on a forced choice PVT. Failure across multiple PVTs likely reflects conscious feigning and is inconsistent with the nonconscious/self-deception processes involved in somatoform symptoms.

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J. SUHR. The Role of Cogniphobia in Symptom and Performance Validity in Neuropsychological Assessment.

Cogniphobia is the fear of engaging in cognitively effortful tasks due to a belief that they might be dangerous neurologically (Dangerousness component) or a belief that avoiding the task will prevent discomfort, pain, or other negative consequences (Avoidance component). Prior work has shown that cogniphobia should be considered as a factor related to symptom and performance validity in neuropsychological assessment. In prior work, we have shown that the Avoidance component in particular is associated with failed performance on performance validity tests (PVTs) and on sustained attention tasks in individuals with chronic headache and were also related to lower pressure pain threshold on the head (Suhr & Spickard, 2012). In a recent multi-site study, we showed that Cogniphobia was the best predictor of PVT failure (among several psychological variables and the MMPI-2-RF validity scales) in a mixed sample of neuropsychological referrals. This was true whether or not there was the clear presence of an external incentive for the participant (Henry et al., 2018). Further analysis of our multi-site data shows that, as in prior work, it is the Avoidance component that is most important to consider with regard to validity of other assessment data. Patients who were high in both Dangerousness and Avoidance, or high in Avoidance only, were more likely to be in an incentive context, were more likely to fail MMPI-2-RF invalidity scales (especially those related to somatic and neurological complaints), and were more likely to fail PVTs (even after accounting for invalidity on the MMPI-2-RF). Discussion of Cogniphobia in the context of broader illness beliefs and implications of these findings for neuropsychological assessment will be discussed.

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J. ROOR, B. FITZGERALD, M. PETERS, H. KNOOP, S. KOEHLER & R. PONDS. Feedback on Underperformance in Patients with Chronic Fatigue Syndrome: Relevant Patient Characteristics and Clinical Impact.

Objective: Performance Validity Tests (PVTs) are used to measure the credibility of neuropsychological test results (i.e., underperformance). Additionally, research suggests that underperformance has negative prognostic value for subsequent treatment, which is likely related to illness beliefs, but studies on this topic are scarce. In this study, we examined which patient characteristics are associated with feedback responsivity upon underperformance (i.e., increased performance on a repeated PVT), and whether this responsivity to feedback is related to treatment outcome in patients with Chronic Fatigue Syndrome (CFS).

Participants and Methods: Data consists of 103 adult outpatients diagnosed with CFS that were provided with feedback upon failing the Amsterdam Short-Term Memory test (i.e., ASTM ≤ 85), after which the ASTM was re-administered. At baseline, all patients also completed questionnaires about fatigue-related complaints and level of functional impairment. After Cognitive Behavioral Therapy (CBT) for CFS was provided, these measures were repeated. Additionally, treatment dropout was examined.

Results: Only level of underperformance at baseline was associated with improvement on the repeated ASTM after feedback. Additionally, patients responsive to feedback reported significantly less cognitive difficulties after CBT compared to patients that continued to fail the ASTM. No differences in treatment dropout were found between these two CFS patient groups.

Conclusions: Level of underperformance has clinical value since it is negatively associated with response to corrective feedback. Additionally, the effect of feedback upon underperformance has prognostic value, as responsive patients show significantly less cognitive difficulties after CBT for CFS compared to non-responsive patients. This implies that change in underperformance after feedback provides additional insight in patient behavior and related illness beliefs, making it useful and clinically relevant.

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R. PONDS, L. CLAESSENS, B. FITZGERALD, M. PETERS & J. ROOR. The Residual Effect of Intentional Feigning on Symptom Reporting and Memory Performance.

Objective: Still much is unknown about the underlying causes of poor noncredible responding, centering around the key question whether patient deliberately fake symptoms. One line of research in this area focuses on the residual effect of symptom over-reporting where individuals might truly come to believe in intentionally fabricated symptoms and lose sight of the conscious origins. Current study examines if a similar residual effect exists for performance tests.

Participants and Methods: An assessment-re-assessment design was used with two experimental groups of undergraduate psychology students; the honest-honest group (n = 18) and the feigning- honest group (n = 19). The Word Memory Test (WMT), the Auditory Verbal Learning Test (AVLT), the Structured Inventory of Malingered Symptomatology (SIMS) and the Brief Symptom Inventory (BSI) were administered at assessment and after one hour at re-assessment. At assessment, the honest-honest group was instructed to perform honestly and the feigning- honest group to feign symptoms. At re-assessment, both groups were instructed to perform honestly.

Results: The feigning-honest group still scored significantly lower at re-assessment on the WMT - Free Recall (WMT-FR) and WMT - Long Delayed Free Recall (WMT-LDFR) in comparison to the honest-honest group. No group effect was found on the AVLT. We did find a significant residual effect for the feigning-honest group on the BSI, but not on the SIMS.

Conclusions: This study provides an important first support for the existence of a residual effect of intentional cognitive underperformance. Earlier findings of a residual effect on symptom reporting were partly replicated. The results show again that intentional feigning symptoms or cognitive deficiencies might result in a more unconscious form of feigning. Different explanations for this phenomenon (e.g. poor introspective abilities, distorted memory learning) and implications for clinical practice will be discussed.

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Poster Session 3. Psychosocial, Psychiatric, & Substance Use

9:30–10:45 a.m.

Drug/Toxin-Related Disorders (including Alcoholism)

D. AASE, K. AKAGI, M. TAN, L. MAUCIERI, S. MILLER, L. ROG, J. GREENSTEIN, L. JASON, K. PHAN & N.H. PLISKIN. Social Cognition Performance in AUD and a NO-AUD Comparison Group: A Pilot Study.

Objective: Social perception includes verbal and nonverbal social information processing skills that may be dysfunctional among individuals with alcohol use disorder (AUD). Recent meta-analyses (Bora & Zorlu, 2016; Castellano et al., 2014) have found moderate effect sizes demonstrating impairment in social perception in AUD (d=.65 and .67, respectively). Facial emotion recognition and interpreting vocal prosody have been consistently impaired (Oscar-Berman et al., 2014). However, the available literature is limited with few comparison samples and has rarely accounted for comorbid psychiatric symptoms. This pilot study evaluated three domains of social perception performance in individuals completing AUD treatment and a comparison group without AUD, while accounting for comorbid depression symptoms and estimated premorbid FSIQ.

Participants and Methods: Subjects were patients participating in a residential treatment program for alcohol use disorders (n=55). Each subject had a primary alcohol diagnosis, had completed detoxification, and had at least 2 weeks of sobriety. Comparison subjects were university students (n=16) with no history of AUD. All subjects were interviewed and administered a brief neurocognitive battery (including measures of *Affect Naming*, *Prosody-Face Matching*, *and Prosody-Pair Matching*) and self-report psychiatric measures.

Results: Preliminary findings suggest that when accounting for estimated premorbid FSIQ and self-reported depression symptoms, subjects with AUD performed significantly worse on measures of *Affect Naming* (partial $\eta^2 = 0.06$) and *Prosody-Pair Matching* (partial $\eta^2 = 0.08$), but not *Prosody-Face Matching*, relative to the comparison group.

Conclusions: These preliminary findings are consistent with prior studies of social perception in AUD, but also account for estimated premorbid intellectual functioning and self-reported depression. Limitations, suggestions for future research, and specific clinical implications will be discussed.

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S.F. ARASTU, R.C. THOMPSON, S.M. MARKUSON, J.S. ADLER & R.B. HIRST. Beyond the Bud: The Impact of Age-of-Onset and Motivation on Executive Functioning and Processing Speed in Cannabis Users.

Objective: Studies show that cannabis use (CU) onset before age 16 relates to deficits in executive functioning (EF) compared to later onset (Gruber et al., 2012). The present study examined the relationship between age of CU onset and EF. Research supports that suboptimal effort during testing negatively influences neurocognitive performance (NP; Heilbronner et al., 2009). This study examined effort during testing to explain poor EF performance in early-onset compared to late-onset users.

Participants and Methods: 62 early- and 48 late-onset cannabis users (71.8% men, M_{age}=20.30) received a motivational or neutral statement prior to completing a neuropsychological test battery, using Digit Span (DS) and the Trail Making Test (TMT), both with embedded effort tests (Reliable DS and TMT B:A ratio). A general linear model (GLM) explored the effect of age of CU onset on EF and effort test performance, controlling for motivation. Multiple regression analyses (MRA) were used to identify the direction and nature of the significant differences.

Results: The GLM yielded significant differences on TMT Part A between early- and late-onset users ($F(1) = 4.237$, $p < 0.05$) and no significant differences between age-of-onset and NP on the effort tests and DS subtests. MRA indicated that for examinees who received the neutral statement, late-onset cannabis users performed significantly better on the TMT Part A (a processing speed task) than early-onset users (B=-4.166, $p < 0.05$). Among early-onset users, receiving the motivational statement predicted better performance on the TMT Part B than receiving the neutral statement (B=-1.590, $p < 0.05$).

Conclusions: The findings suggest that age of CU onset does not correlate with effort on neuropsychological tests. Early-onset cannabis users exhibited slower processing speed than late-onset, further supporting literature suggesting that earlier CU onset is related to neurocognitive deficits. Additionally, the findings indicate that motivated users perform better on EF tasks than non-motivated users.

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K. BIERNACKI, G. TERRETT, I. LABUSCHAGNE, S. MCLENNAN & P. RENDELL. How Do You Feel?: Interoceptive Awareness and Decision-Making in Long-Term Opiate Users.

Objective: Opiate use is associated with relatively severe decision-making impairment that may be due to the inability to perceive emotional signals arising from the body. Emotional signals can be measured by changes in physiology such as heart rate. Interoceptive awareness is the ability to "tune in" to these physiological signals and modify ongoing behaviour. Previous research has demonstrated that more accurate perception of heartbeat (i.e. interoceptive awareness)

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may be linked to better decision-making, however this association has not been analysed in opiate users. The aim of this study was to determine whether increased interoceptive awareness was correlated with improved decision-making ability in both opiate users and healthy controls.
Participants and Methods: 28 opiate users and 34 healthy controls completed the Iowa Gambling Task to measure decision-making ability. Interoceptive awareness was measured using a subjective heartbeat-counting task. Heartbeats were objectively measured using electroencephalogram.
Results: Contrary to expectation, opiate users were able to perceive heartbeat more accurately than controls ($t(58)=2.05$, $p=.045$, Cohen's $d=0.58$). However, there was no significant correlation between decision-making ability and interoceptive awareness in controls ($r=.28$, $p=.111$) or opiate users ($r=.07$, $p=.728$).
Conclusions: The results of this study suggests that opiate users are not more impaired in their ability to perceive physiological signals, contrary to previous research with other drugs users. Thus, interoceptive awareness may not be an important factor in the difficulties faced by opiate users for adaptive decision-making.
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E.A. CRAUN, S. KAPLAN, M.M. WONG & N. ABUCHON-ENDSLEY. Neurocognitive Functioning Mediates the Relationship Between Alcohol Use and Frequency of Criminal Behavior in Jail Inmates.
Objective: Inmates have higher rates of Alcohol Use Disorder (AUD) than the general public (Substance Abuse & Mental Health Services Administration, 2011). Alcoholism has been associated with both neurocognitive deficits and greater frequency of criminal behavior (Smith et al., 1992; Rourke & Grant, 2009). The purpose of this study was to assess the associations between alcohol use, cognitive functioning, and frequency of crime among a sample of jailed individuals. Additionally, as the vast majority of research on this population has been conducted primarily with male inmates only, we assessed gender differences in the relationships among substance use, neurocognitive functioning, and criminal behavior.
Participants and Methods: Two hundred and fifty (58.4% women, aged 18-71) inmates were randomly selected from two U.S Northwestern jails and completed a diagnostic screening interview and brief neurocognitive battery. Criminal history was gathered using publically available online databases.
Results: Structural equation modeling (SEM) revealed a full, negative mediation (Sobel $z=3.10$, $p<0.01$; 95% asymmetric ACI= 0.11 – 0.48, $p<.05$), where neurocognitive functioning mediated the relationship between alcohol use and frequency of criminal behavior. However, no gender differences among the structural paths were revealed.
Conclusions: Alcohol use was associated with neurocognitive deficits, which in turn predicted frequency of criminal behaviors. There were no gender differences in these relations. Implications of the findings on prevention and treatment programs for the incarcerated were discussed.
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M.M. WONG & E.A. CRAUN. Executive Functions Among Children of Alcoholics and Controls.
Objective: We examined whether neuropsychological functioning is different among children of alcoholics and controls in a short-term longitudinal study. Parental alcohol disorder (AUD) has been shown to affect children's executive functions. Children with a positive parental history of AUD (children of alcoholics or COAs) had lower response inhibition compared to controls (non-COAs) (Nigg et al., 2004; 2006). However, in those studies there were no difference between the two groups on other executive function tasks, e.g., Go-No go. In this short-term longitudinal study, we examined whether COAs were different from non-COAs on several executive function tasks.
Participants and Methods: We compared COAs and matched controls (non-COAs) on four executive functions measures over two time-points (T1, T2). T1 ($N=222$; $M_{age}= 10.42$ (1.47); 55% COAs, 50% girls, 65% white) and T2 ($N=144$) was one year apart. The four executive functions are percent non-perseverative and perseverative errors standardized score in the Wisconsin Card Sorting Task, inhibition switching vs. inhibition scaled score in the Delis-Kaplan Executive System's Color-Word Task and number-letter sequencing scaled score in the DKES Trail Making Task.
Results: Controlling for age, gender and ethnicity, COAs were similar to non-COAs on most executive functions measure. The only exception was the percentage of non-perseverative errors at Time 2 ($b=-6.72(2.23)$, $t=-3.02$, $p<.01$). COAs made a higher percentage of non-perseverative errors than non-COAs. At T2, percentage of non-perseverative errors were positively correlated with percentage of perseverative errors in WISC ($r=.41$, $p<.001$), as well as negatively correlated with cognitive flexibility in the Color-Word Test ($r=-.17$, $p<.05$).
Conclusions: COAs performed similarly to non-COAs on almost all executive tasks, which was consistent with previous research (Nigg et al., 2004). However, COAs made a higher percentage of non-perseverative errors than non-COAs.
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M.K. DAHLGREN, K. SAGAR, R. SMITH, A. LAMBROS, M. KUPPE & S. GRUBER. Travelling Down Life's Highway: Earlier Age of Marijuana Onset is Associated with Impaired Driving.
Objective: Marijuana (MJ) use is associated with impaired driving, but thus far, research has primarily focused on the effects of acute intoxication. The current study assessed the impact of MJ use on driving without acute intoxication as well as the effect of prolonged abstinence.
Participants and Methods: Current, heavy, recreational MJ users who were not intoxicated at time of testing were compared to non-MJ-using healthy controls (HC) and former heavy MJ users on a driving simulator program (STISIM Drive, Systems Technology Inc.). In order to assess the potential impact of age of MJ onset, MJ users with early onset (regular use prior to age 16) and those with late onset (regular use at 16 or older) were compared to HCs and former users.
Results: Current users demonstrated poorer driving performance relative to HCs and former users. Specifically, current users had significantly more missed stop signs and spent greater percentage of time over the speed limit relative to both HCs and former users; they also had more speed exceedances, pedestrian collisions, and fewer stops at red lights relative to HCs. Former users and HCs had similar performance. Interestingly, analyses including age of MJ onset indicated that the between-group differences were primarily attributable to the early MJ group. For example, early onset users made significantly fewer stops at red lights relative to HCs, late onset, and former MJ users; no significant differences were detected between the other groups. Further, correlation analyses revealed that earlier age of MJ onset was associated with increased number of collisions and increased number of missed stop signs.
Conclusions: Early onset MJ users demonstrated impaired driving without acute intoxication, while late onset and former users performed similarly to HC participants. These findings underscore the importance of examining age of MJ onset, and suggest that MJ use during a time of neurodevelopmental vulnerability may result in long-term neuropsychological consequences.
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T. GREIF, K. MULHAUSER, C. BAXLEY, A. GRANT, T. BUCHANAN, L. SCHWARZ & J. WEINSTOCK. Impact of Executive Function and Cortisol Stress Responsivity on Substance Use Treatment Outcomes in Prison Inmates.

Objective: Effective self-regulation requires intact top-down cognitive processes and efficient bottom-up stress responsivity. The study aim was to examine the impact of cortisol activation on relationships between executive functions (EFs) and cognitive behavioral therapy (CBT) treatment outcomes in a sample of prison inmates with a history of substance use disorder (SUD). It was hypothesized that the effects of EFs on treatment gains would be moderated by basal cortisol and cortisol activation in response to stress.

Participants and Methods: Participants included male prison inmates (N = 195, median age = 31) with history of SUD who were enrolled in CBT treatment. Participants completed a baseline assessment using the Logan Stop Signal Task (LSST) to measure aspects of EF and salivary cortisol sampling while at rest and in response to a social stressor. Post-treatment outcome was measured by observer-rated CBT treatment gains.

Results: Neither basal cortisol nor cortisol activation in response to stress were significant moderators of the relationship between LSST performance and treatment gains. The strongest of these potential moderators, cortisol activation as a moderator for the effects of LSST performance on treatment gains, exerted only a small effect (Cohen's d = 0.16, 95% CI = -0.11 – 2.27).

Conclusions: These findings do not support our study hypothesis that stress would moderate the relationship between baseline performance and CBT outcome. However, each of these components was assessed separately and future research needs to examine the dynamic interaction of cognitive and physiological aspects of self-regulation to understand their combined impact on the development of and recovery from SUD.

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M.A. HUSSAIN, E.E. MORGAN, J.E. IUDICELLO, R. HEATON & I. GRANT. Loneliness Predicts Risky Sexual Beliefs and Intentions in Methamphetamine Dependent (MA+) Individuals.

Objective: Methamphetamine (MA) use is a known predictor of risky sexual intentions, which has important public health implications including risk of HIV transmission. Loneliness is also associated with sexual risk behavior, though the relationship between loneliness and risky sexual norms and intentions in MA have yet to be examined.

Participants and Methods: Participants included 115 individuals stratified by methamphetamine-dependence (MA+, n=56; MA-, n=59). Participants in the MA+ group met DSM-IV criteria for lifetime (LT) MA dependence and MA abuse within the past 18 months. Study groups did not differ in proportion of HIV+ individuals (~58% per group). Participants completed the Loneliness Scale from the NIH Toolbox-Emotions Module and the Sexual Risk Scale, which includes subscales assessing beliefs about sexual risk "Norms" and "Intentions" to practice safe sex.

Results: Both the continuous loneliness T-score and the proportion of individuals with potentially problematic loneliness (defined by T-score>60) were significantly higher in MA+ than MA- individuals (Cohen's d=0.46, ps<0.05). MA status was significantly associated with loneliness (F=2.62, Adj R^2=0.10, p=0.01), even when controlling for HIV status and other relevant demographics and potentially confounding characteristics (e.g., neurocognitive impairment, mood and non-MA substance use). Within only the MA+ group, loneliness was a significant independent predictor of riskier intentions and normative beliefs regarding safe sexual behavior (ps<0.05), even while controlling for the aforementioned covariates, as well as age at first MA use.

Conclusions: Loneliness is prevalent among MA+ individuals and predicts risky sexual beliefs and intentions above and beyond the impact of other pertinent factors. These findings may help identify those individuals who are at risk of engaging in HIV-related risk behaviors, particularly risky sexual behaviors, and guide interventions to reduce this risk.

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M.M. KANGISER, K. JENNETTE, B. KNECHT, C.M. KAIVER & K. LISDAHL. Gender Moderates the Impact of Binge Drinking on Cognition in Young Adults.

Objective: Nearly 1/3 of young adults report binge drinking in the past 2 weeks. Binge drinking is associated with poorer cognition in young adults, although few U.S. studies have examined the impact of gender and used a battery of neuropsychological tests. We aimed to examine the effect of gender and binge drinking on cognitive functioning in U.S. young adults using a neuropsychological battery emphasizing executive functioning and attention.

Participants and Methods: 55 participants (28 female, 27 male) aged 18-25 were selected from the parent study. Participants underwent questionnaires, toxicology/pregnancy testing, drug use interview, MRI scan, and neuropsychological battery. Selected measures examined executive functioning and attention. A series of multiple regressions was conducted to examine whether past year binge drinks or past 3 months maximum binge drinks predicted cognitive outcomes while covarying for gender, WRAT-4 Reading score, and past year cannabis joints and cigarettes; we examined if gender moderated these findings.

Results: The past year binge drinks*gender interaction was significantly related to performance on D-KEFS Color-Word Inhibition/Switching condition (p=.02) and PASAT (p=.01). Females exhibited poorer performance on Inhibition/Switching with greater binge drinks, while males had the opposite effect. Females displayed better performance on PASAT with greater binge drinks, while males experienced slightly poorer performance. Females reported greater executive dysfunction with higher recent maximum binge drinks (p=.02).

Conclusions: Increased binge drinking was associated with poorer executive functioning in females, but better executive functioning in males. Additionally, recent binge drinking severity may differentially affect executive functioning in females. However, greater cumulative binge drinks were associated with better sustained attention in females. Future studies should examine these effects in a larger, longitudinal sample.

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E. LIVINGSTON, K. GICAS, K. WACLAWIK, T. O'CONNOR, W. PANENKA, O. LEONOVA, A. BARR, D. LANG, T. BUCHANAN, G. MACEWAN, W. HONER & A. THORNTON. Substance Use Profiles & Cognition in Marginally Housed & Homeless Individuals.

Objective: Using cluster analysis we sought to determine the substance use profiles of a marginalized sample and to ascertain cognitive differences in these profiles, given their complex patterns of poly-substance.

Participants and Methods: Participants were adults (N=283, Mean Age=45.1, 77% Male) recruited from marginal housing for an ongoing longitudinal study. Daily substance use was self-reported monthly using the Time Line Follow Back for a period of 6 to 13 months (M=11.39, SD=2.01). Cognition was assessed yearly with measures of verbal memory and response inhibition (Hopkins Verbal Learning Test Revised and Stroop Test, respectively). A two-step cluster analysis (Hierarchical & K-means) characterized frequency patterns of five substances (alcohol, cannabis, cocaine, methamphetamine, and heroin). Profile differences in cognition (a composite of HVLT-R immediate and Stroop Color-Word scores) were assessed using ANOVA.

Results: The cluster analysis revealed six user profiles. While all groups used the full range of substances, the groups were separated on preferential use of alcohol (n=26), cocaine (n=75), cocaine and heroin (n=18), methamphetamine and heroin (n=28), and cannabis (n=130). A high-frequency use group was dropped from subsequent analyses due to low group size (n=5). The group preferentially using methamphetamine and heroin outperformed the alcohol and cannabis using groups

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($F(4.272)=3.57$, $p=0.007$, partial $\eta^2=0.05$), after accounting for age, gender, and education. Chi-squared analyses revealed that groups did not differ at baseline on self-reported traumatic brain injuries, stroke, or learning disabilities, as well as diagnoses of schizophrenia or schizoaffective disorder, hepatitis C, or HIV.

Conclusions: Substance use in this population can be clustered into profiles, allowing for the study of complex poly-substance use. Select profiles of use were associated with variation in cognition. Further investigation of these substance use profiles over time, as well as capturing acute use, appears promising.

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C. KEITH, W. MCCUDDY, K. NOSE, D. HARVEY, L. LANDER, J. BERRY, M. HAUT & J.J. MAHONEY. The Relationship between Cognition and Potential Moderating Factors in Individuals with Opioid Use Disorder.

Objective: To examine the relationship between potential moderating factors (e.g. IQ, mood, trauma, sleep dysfunction/fatigue, pain) impacting cognition in abstinent opioid users on buprenorphine maintenance.

Participants and Methods: Abstinent opioid users currently enrolled in WVU's Comprehensive Opioid Addiction Treatment program completed a comprehensive cognitive battery and self-report measures assessing the above variables.

Results: Participants (n=17) were predominantly male (65%), ~35 years old, with 12 years of education. Cognitively, as assessed via the HVLT-R and BVMT-R, as a group this sample demonstrated mildly impaired verbal and visual learning (7^{th} and 4^{th} %ile, respectively) and delayed memory (both 7^{th} %ile). Also, when compared to those with Average IQ (WASI-2 FSIQ: 97.0±4.1; Mean±SD), those with Below Average IQ (83.8±5.5; $p=.002$) demonstrated relatively reduced performances on measures of working memory and word reading ($p<.05$) and trends toward significantly reduced graphomotor processing speed, set-shifting, and semantic fluency ($p<.08$). On self-report measures, participants as a whole endorsed elevated symptoms of depression, anxiety, childhood trauma, impulsivity, and sleep dysfunction. Negative correlations were detected between the following variables: information processing speed (Stroop) with anxiety, pain, and sleep dysfunction; semantic fluency and set-shifting with depression; verbal learning with elevated daytime sleepiness (r's > .67).

Conclusions: Given that cognitive impairment is associated with poor treatment outcomes in substance users, along with the well-established cognitive sequelae related to substance use, the possibilities of moderators exacerbating cognitive deficits, including lower IQ, elevated emotional symptoms, and fatigue, warrants further investigation. Modifications to treatment plans through the concurrent treatment of other factors/symptoms such as sleep, anxiety. With an improvement in cognition, increased engagement in treatment and improved outcomes may be possible.

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K.E. MAPLE, A. THOMAS, A. WALLACE & K. LISDAHL. Blunted Rostral Anterior Cingulate Activation During an Emotional Inhibition Task in Chronic Cannabis Users.

Objective: Previous work suggests cannabis users, relative to non-users, have abnormal anterior cingulate cortex (ACC) activation and structure associated with processing emotional content (Gruber et al., 2009; Wesley et al., 2016; Maple et al., under review). The current study sought to expand the literature by investigating the relationship between chronic cannabis use and rostral anterior cingulate (rACC) activation during emotional inhibitory processing.

Participants and Methods: Exclusion criteria included neurological and psychiatric disorders, psychotropic medication use, and excessive other drug use. Included in the analysis were 66 individuals (34 cannabis users and 32 non-users), ages 16-25. During 3T functional magnetic resonance imaging (fMRI), participants completed a facial emotion go/no-go task previously used with healthy adolescents (Casey et al., 2008; Somerville et al., 2010). All images underwent standard preprocessing steps using the Analysis of Functional Neuroimages software package (AFNI; Cox, 1996). FreeSurfer's Desikan-Killiany atlas (Desikan et al., 2006) was used to define the rACC for each participant. Using an ROI approach, regressions were run to compare between group mean bilateral rACC activation during successful fearful-calm emotional inhibition. Covariates included gender, past year alcohol use, and past year nicotine use.

Results: Chronic cannabis users, relative to non-users, had significantly lower fearful-calm activation in the left [$beta=-.42$, $t= -3.08$, $p<.01$] and right [$beta=-.42$, $t= -3.07$, $p<.01$] rACC.

Conclusions: These findings suggest that regular cannabis use may dampen rACC activation during emotional response inhibition. This is consistent with previous studies noting blunted ACC activation during facial emotion processing (e.g., Gruber et al., 2009) and suggests involvement of specifically the rostral ACC during emotional inhibition. Notably, longitudinal studies are needed to clarify causal factors driving aberrant emotional inhibition in cannabis users.

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B.V. MORGAN & J. SUHR. Individual Difference Factors Associated with High-Risk Substance Use in College Students.

Objective: Neuroticism, trait impulsivity, and neurocognitive deficits on behavioral measures of impulsivity are risk factors of problematic substance use. In the present study, we investigated differences in high-risk and low-risk for Alcohol Use Disorder groups in neuroticism, impulsivity, and Iowa Gambling Task (IGT) performance during a manipulated mood context.

Participants and Methods: Participants were 189 undergraduate students (mean age 19.38; 107 female) who endorsed binge use of alcohol on the Alcohol Uuse Disorder Identification Test (AUDIT) as part of a larger study. For the present analyses, participants were assigned to either high- or low-risk drinking groups based on total AUDIT score. Participants completed the NEO Five-Factor Inventory-3 (NEO-FFI-3) and the UPPS-P Impulsive Behavior Scale (UPPS-P). For the mood context, participants viewed 30 images selected from the International Affective Picture System (IAPS) depending on assigned mood condition (positive, negative, or neutral) prior to and during IGT task completion.

Results: The high-risk group scored significantly higher on the impulsivity traits of negative ($p < .001$) and positive urgency ($p = .002$), lack of premeditation ($p = .002$) and lack of perseverance ($p = .003$), as well as neuroticism ($p = .05$), relative to the low-risk group. Additionally, each of these traits were predictive of risk status in females, but not in males. Regarding IGT performances, high-risk males performed most risky in both positive and negative mood conditions, unlike low-risk males. Female performed riskier in the negative mood condition and least risky in the positive mood condition, regardless of risk status.

Conclusions: Consistent with prior research, neuroticism and the UPPS-P impulsivity dimensions are related to high-risk alcohol use in college students, but findings also suggest differential relationships between risk status and IGT performance based on gender and mood state, suggesting future investigations should consider role of emotion context and gender.

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K. MULHAUSER, L. POE, A.B. MCGRATH, J. LACE, L. SCHWARZ, T. BUCHANAN & J. WEINSTOCK. Executive Functions and Cortisol Stress Responses: A Path Analysis of Substance Use Disorder History on CBT Treatment Outcomes.

Objective: Substance use disorder (SUD) may be characterized as a failure in self-regulation influenced by neuropsychological, physiological, and environmental factors. Specifically, top-down processes of executive functions (EFs) and bottom-up processes of stress reactivity are often dysregulated in persons with SUD. The present analysis evaluated the relationships among history of SUD, EFs, and stress-induced cortisol responses on cognitive behavioral therapy (CBT) treatment outcomes.

Participants and Methods: Participants (*N*=195) included male prison inmates between the ages of 21 and 49 years old. Eighty-five percent of participants reported a personal history of substance use, with 54% having previously participated in SUD treatment. At treatment entry, participants were evaluated on three measures of EFs (Stroop Color-Word Test, Logan Stop Signal Task, Cambridge Decision Making Task) and underwent the Trier Social Stress Test to evaluate cortisol stress reactivity. Treatment gains were evaluated by social workers facilitating the treatment program.

Results: A path model examining the unique contributions of each measure of EFs and both resting state cortisol and stress-induced cortisol activation provided a good fit to the data. The χ^2analysis (χ^2[10]=17.51, p=.064) and the Comparative Fit Index (CFI=0.95) both indicated a good fit. The overall model with parameter estimates is presented and discussed.

Conclusions: This analysis explored aspects of the complex interactions between top-down and bottom-up processes implicated in SUD and CBT treatment. Personal and family history of SUD demonstrated differential effects on aspects of EF and stress reactivity, in turn influencing treatment gains. Selective attention and response inhibition accuracy provided the strongest indication of success in the treatment program. Addressing dysregulations in both EFs and stress reactivity may significantly contribute to SUD treatment effectiveness.

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P. OLSEN, J. ARNSTEN, T.M. SCOTT, F. ARIAS, A. MANGALONZO, C. ZHANG & M.G. RIVERA MINDT. The Role of Smoking on Neurocognitive Functioning in Persons with Opioid Use Disorder.

Objective: Smoking prevalence in persons in substance use treatment programs is 3-4 times that of the general population and highest among persons with opioid use disorder (OUD). Heavy smoking is related to neurocognitive (NC) impairment in attention/working memory, learning/memory, and executive functioning. Heavy opioid use is also related to impairment in these domains. As the U.S. opioid epidemic grows, combined exposure to tobacco and opioids may elevate risk for NC impairment. This study examined how smoking and OUD affect NC functioning.

Participants and Methods: The sample included 95 OUD participants (*M* age=42.1 years±10.2; *M* education=11.5 years±2.3; 27% female). Participants completed a comprehensive NC test battery. Average T-scores were calculated for all neurocognitive domains (e.g., attention/working memory, learning/memory, executive functioning). Participants were self-reported "current smokers" or "nonsmokers." Heavy smoking was assessed using pack-years (i.e., multiplying the number of packs smoked per day by the number of years smoked). Participants with 10 or more pack-years were considered "heavy smokers." A series of t-tests were computed to determine whether: 1) current smoking affects NC function, and 2) heavy smoking affects NC function.

Results: First, participants were stratified into two groups: current smokers (n=75) and nonsmokers (n=20). The t-test analyses revealed that current smokers demonstrated significantly worse attention/working memory (*M*=42.0±10.2) than nonsmokers (*M*=46.8±9.0; t(93)=2.08, *p*=.04). Second, heavy smokers (n=30) were compared to nonsmokers (n=20). The t-test analyses did not reveal any significant differences between heavy smokers and nonsmokers (all *p*s>.05).

Conclusions: Current smokers demonstrated worse attention/working memory when compared to nonsmokers. Persons with OUD who currently smoke may be at risk for worse NC function. Further larger-sample studies are necessary to elucidate the relationship between heavy smoking and NC function in persons with OUD.

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B. REYNOLDS, M. BASSO & R. AUPPERLE. Blackouts, hangovers, and lasting consequences: The role of executive function and trait impulsivity in substance use behavior.

Objective: Recent research indicates that executive function (Bates et al., 2014; Mukherjee & Kable, 2014) and trait impulsivity (Berg et al., 2015) are linked to drug misuse. However, few studies have concurrently evaluated these constructs in relation to substance use and its consequences. Accordingly, the present investigation explored the relative contributions of executive function and impulsivity across multiple facets of drug use.

Participants and Methods: Eighty-four females (university students, n = 42; forensic outpatient, n = 42) without neurologic disease or developmental disorder were evaluated. Both samples were administered an impulsivity questionnaire (UPPS-P; Cyders et al., 2007), the D-KEFS Color-Word subtest (Delis et al., 2001), Iowa Gambling Task (IGT; Bechara, 2007), and a brief self-report survey of recent drug use (i.e., past two months). Response bias was evaluated with the Marlowe-Crowne Social Desirability Scale (MCSDS; Crowne & Marlowe, 1960). All analyses covaried for education level.

Results: Zero-order correlations revealed significant associations between IGT (r = -.28 to -.34), D-KEFS (r = -.31 to -.33), UPPS-P (r = .26 to .51) and substance use. Multiple regression revealed that only the IGT predicted work/school intoxication, UPPS-P predicted hazardous use, and D-KEFS predicted blackout episodes. Executive function and impulsivity both accounted for hangovers and role failures (r = .20 to .40).

Conclusions: These results reveal a robust relationship between executive function, trait impulsivity, and substance misuse. We observed unique, independent contributions from both our cognitive and personality measures. The data imply both constructs may account for meaningful variance in drug use behaviors and consequences. Given our mixed sample, these relationships may generalize across clinical and non-clinical populations.

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A.S. ROSEN & R.B. HIRST. Cannabis-User Eyewitnesses not so "Far Out": Lineup Identification Accuracy Similar Among Cannabis Users and Nonusers.

Objective: Eyewitness identifications pose a significant threat to defendants, with mistaken identifications being responsible for 59% of DNA-exonerated convictions (The National Registry of Exonerations, 2017). Thus, it is essential to evaluate factors impacting lineup selection accuracy. With recent legislative changes, research demands attention toward the potential impact of cannabis on eyewitness memory, as only one study of this nature exists (Yuille, Tollestrup, Marxsen, Porter, & Herve, 1998).

Participants and Methods: In this pilot study, chronic cannabis users (i.e., individuals using cannabis ≥ 4 days/week for ≥ 1 year who were asked to abstain for ≥ 24 hours; *n* = 11; 63.6% male; mean age = 28.8 years) and nonusers (*n* = 9; 22.2% male; mean age = 30.2 years) viewed a simulated crime video depicting a man switching his luggage with an unwary victim at the airport. Participants then completed a filler task, a lineup identification task, and a 1.5-hour neuropsychological battery.

Results: Cannabis users and nonusers did not differ significantly on any trial of the Rey Complex Figure Test. In addition, there was no significant association between user status and lineup identification accuracy.

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Further analyses revealed significantly faster lineup selection response speed among accurate users (mean rank = 3.20) relative to inaccurate users (mean rank = 8.33), $U = 1$, $z = -2.56$, $p < .01$. Accurate and inaccurate nonusers did not differ with regard to response speed.
Conclusions: Preliminary findings suggest that the reliability of chronic cannabis-user identifications is comparable to that of the general public, augmenting Yuille et al.'s (1998) findings among acutely intoxicated users for greater relevance to a budding population of chronic users. Thus, identifications should not be discounted solely on the basis of cannabis-use status. Findings also suggest that response speed may be indicative of reliability among cannabis users; however, more research is needed to ascertain whether this can be used in an applied context.
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T.M. SCOTT, J. ARNSTEN, P. OLSEN, F. ARIAS, A. MANGALONZO, C. ZHANG, A. GAVARRETE OLVERA & M.G. RIVERA MINDT. The Role of Neurocognitive Functioning, Cocaine Use, and Dose on Medication Adherence in Patients Receiving Opioid Agonist Treatment.
Objective: Opioid agonist treatment (OAT; methadone or buprenorphine) is the gold standard treatment for opioid use disorder (OUD). Although studies have focused on factors related to OAT retention for treatment success, medication adherence may be more important for OAT efficacy. This study examined how neurocognitive (NC) functioning, comorbid cocaine use, and OAT dose predict OAT adherence in the first 60 days of OUD treatment and explored the relationship between OAT dose and NC functioning.
Participants and Methods: The sample included 85 OUD participants (*M* age=42.4 years [*SD*=10.4]; *M* education=11.5 years [*SD*=2.3]; 27% female) randomized to methadone (n=53) or buprenorphine/naloxone (n=32). All participants were enrolled in an OAT program for at least 4 weeks. At baseline, they completed a comprehensive NC test battery. Average T-scores were calculated for all neurocognitive domains (e.g., learning/memory, attention/working memory, executive functioning). Cocaine use was assessed by random urine toxicology screenings (positive results/total tests), and OAT dose (high/low) was recorded at treatment day 28 to ensure stability. OAT adherence was recorded as days observed medicated/60 days.
Results: The regression model predicting OAT adherence was significant (R^2=.20, p<.001) with less comorbid cocaine use (p <.001) and higher OAT dose (p=.04) predicting better adherence. Although NC functioning was not a significant predictor (p=.61) of adherence, t-tests revealed that higher OAT dose was associated with significantly worse learning/memory and attention/working memory than lower OAT dose (all ps<.05).
Conclusions: Less comorbid cocaine use and higher OAT dose predicted higher OAT adherence. Learning/memory and attention/working memory were worse in patients on high versus low doses. Clinicians should target reducing comorbid cocaine use and ensuring that OAT patients are stabilized on adequately high OAT doses when entering treatment for OUD. Finally, patients requiring high OAT doses may be at risk for worse NC outcomes.
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R.C. THOMPSON, S.F. ARASTU, S.M. MARKUSON, J.S. ADLER & R.B. HIRST. Examiner Expectancies about Cannabis Use Negatively Affect Neurocognitive Performance in a Sample of Chronic Cannabis Users and Non-Users.
Objective: Studies show mixed findings on how cannabis affects neurocognitive performance (NP) in chronic users. Researchers attribute methodological variability as a potential confound, and preliminary research points to examiner expectancies (i.e., influence of examiner expectations about chronic cannabis use [CU] effects on examinee NP) as negatively impacting chronic cannabis user NP (Sodos, Hirst, Watson, & Vaughn, 2018). The present study aimed to support previous findings that examiner expectancies negatively affect NP in examinees judged as cannabis users compared to those judged as non-users.
Participants and Methods: Participants included 110 chronic cannabis users and 71 non-users (59% men, M_{age} = 20.27) who completed a neuropsychological battery, including the California Verbal Learning Test–II (CVLT-II), Wechsler Adult Intelligence Scale–III Digit Span (DS), and Trail Making Test (TMT). Examiners privately judged examinees as either users or non-users while blind to the examinee's actual user status. Using a general linear model (GLM), the authors examined NP of examinees judged as users versus those judged as non-users, controlling for age of CU onset, age at testing, education, gender, motivation, total days of use, and user status.
Results: Examiners judged 91 of the 181 examinees as users (sensitivity = 60%, specificity = 65%, positive predictive value = 73%, negative predictive value = 51%). GLM results showed worse NP in examinees judged as users on DS Backward (M_D = -.907, p = .037) and TMT Part B (M_D = 8.822, p = .026) but, unexpectedly, not on the CVLT-II.
Conclusions: The present study supports previous findings that blinded examiners can distinguish between cannabis users and non-users better than chance, introducing significant examiner expectancy effects (Sodos et al., 2018). Moreover, examiner biases negatively affect NP in examinees judged as users, suggesting that blinded designs do not adequately address validity concerns in cannabis research methodology.
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N.P. VADHAN, R. VITALE, A. JADANOVA, D. SELVA KUMAR, G.C. NITZBURG, F. MUENCH, C.E. MYERS & J. MORGENSTERN. Changes in Risk-Taking and Punishment Sensitivity in Problem Alcohol Drinkers During Adaptive Psychological Treatment.
Objective: Reward/punishment sensitivity are related to the frequency and subjective effects of alcohol use, and problem drinkers exhibit increased risk-taking on behavioral tasks relative to healthy controls. Our ongoing study aims to examine changes in these characteristics during psychological treatment for problem drinking.
Participants and Methods: To date, 17 adult (M=51.9 years old [SD=10.3]; 10 female) problem drinkers (31.2 SDUs/week [20.7]) have enrolled in a cognitive testing protocol attached to a 13-week clinical trial of adaptive cognitive-behavioral interventions. This protocol includes the computerized Reward/Punishment Learning (RPLT) and Balloon Analogue Risk (BART) tasks, administered at weeks 1, 4 and 13. The RPLT assesses how consequence type impacts associative learning by requiring participants to categorize abstract stimuli based on accuracy feedback that is probabilistically rewarding, punishing or neutral (i.e., gain or loss of 25 points, or neither, respectively). The BART assesses risk-taking by requiring participants to "pump" digital balloons via mouse-click to earn money (25¢/pump), with successive clicks increasing the risk of a pop and loss of accrued money. Task performance was reinforced with a real monetary incentive.
Results: Compared to week 1, on average the participants exhibited decreased optimal responding on punishment trials on the RPLT at week 4 (p<0.05), and increased number of adjusted average pumps on the BART at weeks 4 (p<0.001) and 13 (p=0.06). Self-reported number of weekly drinks, assessed by timeline follow-back, roughly halved during treatment (p<0.05).
Conclusions: Contrary to expectations, problem drinkers exhibited decreasing punishment sensitivity and increasing risk-taking across a relatively successful psychological treatment. These trends may be related to mood improvements (BDI-II) during treatment (p<0.05). Overall, these data suggest that future research on the relationship between changes in risk-taking, reward/punishment learning and alcohol use is warranted.

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Emotional and Social Processes

E.J. AHNE, I. VELEZ-URIBE & M. ROSSELLI. The Effects of Language Exposure and Proficiency on Personality and Alexithymia in Spanish-English Bilinguals.

Objective: The objective was to investigate personality traits and alexithymia in Spanish (Sp)-English (En) bilinguals (SEBs). It was anticipated that (1) age of acquisition of English (AoA En) would predict the En Big Five Inventory (BFI) traits extraversion (BFI E), agreeableness (BFI A), and conscientiousness (BFI C); (2) measurements of language exposure (Exp) and proficiency (Prof) were accurate predictors of BFI scores. Furthermore, alexithymia scores would predict En and Sp BFI scores: higher scores predicting high neuroticism (BFI N) and low openness (BFI O).

Participants and Methods: All 135 SEBs (M_{age} = 21.46; *SD* = 4.88) indicated Sp as their native language (L1), although the majority (n = 115) indicated En (L2) as their dominant language. The BFI questionnaire was given in both En and Sp. BFI difference scores were calculated by subtracting En scores from Sp scores (BFI Diff). The Toronto Alexithymia Scale (TAS-20) was administered in En. Four Exp and Prof variables were calculated from the LEAP-Q: Exp En, Prof En, Exp Sp, and Prof Sp.

Results: AoA En had a significant effect on Sp BFI N, $F(16, 118) = 1.93$, $p = .02$. For En BFI, Prof En influenced BFI A, $\beta = .22$, $t(134) = 2.42$, $p = .02$. While for Sp BFI, Exp En influenced BFI A, $\beta = -.20$, $t(134) = -2.03$, $p = .05$; and BFI C, $\beta = -.21$, $t(134) = -2.12$, $p = .04$. The sample was non-alexithymic ($M = 46.06$, $SD = 11.44$). TAS-20 score significantly predicted all En BFI scores. For Sp BFI, TAS-20 only significantly predicted BFI C, BFI N, and BFI O.

Conclusions: All BFI traits were higher in En than Sp, except for BFI N. Exp and Prof variables did not influence personality scores. The difference in L1 and L2 BFI scores might be due to differences in language embodiment. The findings suggest that TAS-20 may not be as generalizable across languages as previously suggested, and future studies should administer TAS-20 in both L1 and L2 and group bilingual participants based on whether L2 was learned simultaneously or sequentially.

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C. BEAUDOIN, E. LEBLANC, C. GAGNER & M. BEAUCHAMP. Abilities in Theory of Mind Space (ATOMS): A Conceptual Framework Derived From Measures of Theory of Mind for Preschoolers.

Objective: Theory of Mind (TOM), the ability of infer mental states to self and others, is a crucial building block of social cognition that emerges in the preschool years. TOM has been studied extensively in young children, but the bulk of this work focusses on the specific ability to infer beliefs, overlooking other TOM sub-components and thus hindering a comprehensive picture of TOM composition and development. The objective of this study was to develop a classification of TOM abilities relevant to preschoolers, in order to better represent the construct of TOM and guide theoretical and measurement efforts.

Participants and Methods: A systematic review of the literature was conducted to identify preschool TOM measures (1985-2017). A qualitative content analysis of the included measures was performed to extract the discrete mental states and sub-abilities that were assessed.

Results: A conceptual organization of TOM emerged from the content analysis of the 179 measures included in the systematic review. The Abilities in Theory of Mind Space (ATOMS) framework is composed of eight categories of mental states and social situation understanding and 32 sub-abilities.

Conclusions: ATOMS is an empirically-driven framework that provides a structure for detailing TOM sub-components and for associating them with a nomenclature that could be applied to clinical, theoretical and methodological work.

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E.M. MURRAY, A.D. BONO, J.T. TWAITE, R.J. STAFFORD, K.A. SCORPIO, M.M. LUBOMSKI-HALFACRE, K. ALTERESCU, J.L. SPIELMAN, A. HALPERN, L.O. RAMIG & J.C. BOROD. The Intensity of Emotional Experience and Facial Expression in Individuals with Parkinson's Disease (PD) and Healthy Adults.

Objective: Parkinson's disease is associated with motor and cognitive deficits, but emotion deficits can also occur (McCabe et al., 2010). Less work exists on emotional experience and its relationship to expression. This study examined emotional experience and expression, and their relationship, in PDs and healthy controls (HCs). Prior work with smaller subsets of data from this project examined experience or expression in both groups (Bono et al., 2016; Borod et al., 2008; Twaite et al., 2013).

Participants and Methods: Sixty-two PDs and 20 demographically-matched HCs recalled previous events (Happy, Sad, Angry, & Neutral) while being videotaped (*New York Emotion Battery*; Borod et al., 1992). Self-reported experience during monologues was recorded via 7-point scales (minimum to maximum): immediate emotional feelings, intensity of feelings during monologues, and monologue production accuracy. Undergraduates (n=24), naïve to hypotheses, viewed 15-sec silent video clips of posers' monologues and rated each clip on a 7-point scale for facial emotional intensity (FEI).

Results: For expression, a 2 (Group) x 2 (Gender) x 4 (Event) ANOVA was conducted. PDs were rated as significantly less intense than HCs. The 3-way ANOVA on experience yielded no significant main effects or interactions involving Group for any of the 3 variables. Correlations were conducted for the 2 groups for FEI vs. each experience variable for each emotion. For PDs, all correlations were positive, but only significant for Sad. For HCs, for Angry, all 3 correlations were significant and inverse.

Conclusions: PDs expressed emotion with less intensity than HCs, but groups did not differ in experience. For PDs, expression was positively correlated with experience for Sad. As PDs with hypomimia can be perceived as unhappy (Pentland et al., 1988), higher correlations here might have occurred. For HCs, Angry expressions were inversely correlated with experience, perhaps due to social display rules (Ekman & Friesen, 1969) and the facial feedback hypothesis (Buck, 1992).

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T.S. BROUGHTON, G. ANDREWS & C. SPROMBERG. Heart and Brain Responses to Aggression: Studying Conforming and Non-Conforming Men.

Objective: To explore heart rate variability and prefrontal lobe activity for indications of response differences to aggression in men.

Participants and Methods: Participants (n=23) in the high or low quartiles from a study of undergraduate men (n=202) who completed the Conformity to Masculine Norms Inventory (CMNI) (Mahalik et al., 2003) were invited to participate in a second study. All men were single; 83% white, 17% men of color, age range 18-29 yrs. The CMNI is a 94 item rating scale with 11 scores measuring traditional masculine norms. The Thurston Cradock Test of Shame (TCTS, 2009) is a 10 card projective test to evoke shame-based themes with dichotomous scoring. Electroencephalogram (EEG) and electrocardiogram (ECT) measures were gathered using Biopac MP150 focusing on electrodes FP1 and FP2 as participants viewed TCTS stimulus cards. Heart Rate Variability (HRT) was calculated using Kubios software.

Results: TCTS Aggression scores analysis found a main effect for cards (p<.001), Card 3 was significantly higher. CMNI analysis revealed conforming men scored significantly higher on Power Over Women (POW; M=7.09, p=.033). There was a mean power for FP1 and FP2 channels interaction trend (p<.06) for Aggression and CMNI groups. Right prefrontal mean power was lower for non-conforming men who failed to identify aggression. HRV indicated a significant interaction with stress (Vagal Withdrawal) in non-conforming men who ignored the aggressive themes and coping (Vagal Tone) for non-conforming males who acknowledged aggression.
Conclusions: Non-conforming men expressing less POW, are less likely to identify aggressive behavior, and have lower levels of activity in the right prefrontal orbital area than men who conform to traditional masculine values and identify aggression. Non-conforming men identifying aggression show increased stress arousal compared to non-conforming men who did not identify aggression. Identifying overt aggression leads to stress and coping through a physiological "ignoring" in non-conforming men.
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N. CASTOR & F. EL MASSIOUI. Relationship Between Emotional States and Resilience in Brain-Injured Patients.
Objective: Brain damage generally generate anxious and depressive symptoms that may affect recovery process. Consequently, patients must face up to their loss and be resilient. Given the importance of resilience in stressful events and emotional disorders following brain damage, we aimed to verify the existence of a relation between resilience and emotional states.
Participants and Methods: We recruited 49 adults who suffered from TBIs and 42 from strokes. Resilience degree, self-esteem, depressive and anxious symptoms were assessed twice, with at least two months between assessments. To rate these psychological components, the French versions of these scales were used.
Results: No depressive (M=5.30, SD=4.62) and anxious symptoms (M=5.04, SD=5.48) was found at both assessments. Self-esteem (M=33.38, SD=5.78) and resilience degree (M= 69.40, SD=14.44) appeared elevated for both assessments. During the first assessment, resilience scale was negatively correlated to depression (r=-0.21, p=.04) and anxiety (r=-0.22, p=.03), whereas it was positively correlated with self-esteem (r=0.38, p<.001). At the second assessment, resilience was negatively correlated to depression (r=-0.37, p<0.001) and anxiety (r=-0.33, p=0.001) while it was positively correlated to self-esteem (r=0.54, p<0.001).
Conclusions: In this study we wanted to examine if emotional states were related to resilience. The results reveals that resilience is related to self-esteem along with depressive and anxious symptoms. Indeed, the higher is the degree of resilience, the greater is the level of self-esteem and the lower are the levels of depression and anxiety. This study is part of a longitudinal research that attempts to expose the various factors of recovery in head traumas.
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U. CLARK. Exposure to Racial Stereotypes about Alcohol and Substance Use Leads to Increased Impulsivity in African American Social Drinkers.
Objective: Stereotype threat is a behavioral phenomenon that arises when environmental cues evoke negative stereotypes associated with an individual's group, triggering cognitive processes that adversely impact behavior. A false but enduring stereotype of African American communities is that they experience high levels of alcohol and substance use disorders (A/SUD). Yet, the effects that these stereotypes have on behaviors that mediate A/SUD risk have not been previously explored. This study examined whether exposure to racial A/SUD-related stereotypes leads to an increase in impulsivity—a known mediator of A/SUD risk.
Participants and Methods: African American social drinkers (n=25) were randomized into either the Stereotype Threat (ST, n=14) or Control (CNT, n=11) group. All participants completed a measure of impulsivity (delay discounting, DD) administered both before and after a cue. ST participants received a race-A/SUD-related cue; CNT participants received a neutral cue. Group differences in cue-induced shifts in impulsivity were examined using ANCOVA controlling for variables known to impact DD (e.g., IQ). Associations between cue-induced impulsivity shifts and recent drinking behaviors, quantified using the Timeline Followback, were also examined.
Results: Increases in cue-induced impulsivity were greater in the ST group than in CNT (p=.024), with the ST group exhibiting greater impulsivity than CNT after (p=.012) but not before (p=.225) the cue. In the ST group, ST-induced impulsivity was positively associated with drinking behaviors, over and above baseline (pre-cue) impulsivity (drinks/week, p<.001, ΔR^2=.73; heavy drinking episodes, p=.008, ΔR^2=.44). Associations in CNT were nonsignificant.
Conclusions: In African American social drinkers, exposure to racial A/SUD-related stereotypes induces an increase in impulsivity, which is uniquely associated with recent drinking behaviors. Such data indicate that stereotype exposure elevates a known mediator of A/SUD risk and may thus potentially impact drinking propensity.
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S. COLL, F. EUSTACHE, D. PESCHANSKI, C. KLEIN PESCHANSKI, F. DOIDY, F. FRAISSE, J. DAYAN, P. GAGNEPAIN & M. LAISNEY. Social Cognition Deficits in the Post-Traumatic Stress Disorder Following Paris Terrorist Attacks in November 2015.
Objective: Terrorist attacks the 13th of November 2015 in Paris, have greatly moved and shocked people. In order to understand the psychological and neurobiological consequences of trauma, the 13-November program was launched. In this context, our study focuses on the social cognition abilities of participants having been directly exposed to these events. Several works show an impairment in some social skills in post-traumatic stress disorder (PTSD), that may be associated with an abnormal processing of emotions. For e.g., a bias toward negativity was shown, as well as emotion recognition difficulties. To better understand the scope of these deficits and the resilience mechanisms that may come into play in participants exposed to the same trauma, we created an eye-tracking task investigating visual exploration patterns when processing emotional faces.
Participants and Methods: 105 participants exposed to the terrorist attack of November 2015 took part in the study. Among them, 54 developed a PTSD and 51 did not. Their results were compared to 57 control unexposed participants. The task was to associate faces expressing surprise, anger, pride and embarrassment with labels while their eye movements were recorded with an eye tracker. Our analyses focused on the eye region, in which we compared the mean fixation times between participant groups and emotions.
Results: Although no significant differences with control participants were observed, people having been exposed to the events and who developed a PTSD tend to show less fixation times on the eye region than people exposed without a PTSD.
Conclusions: As shown in the literature, the eye region is a crucial area when processing a face and in particular for the emotion recognition. The fact that exposed participants with a PTSD tend to allocate less attention to the eye area than exposed participants without a PTSD highlight two different ways of processing emotions depending on the clinical development of a PTSD and point out the importance of vision as a resilience marker.
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S.N. ROLIN, J. ACOSTA, J. DAVIS, R.B. FROST & C.M. MULLEN. Is Pseudobulbar Affect Underdiagnosed among Rehabilitation Patients?

Objective: Pseudobulbar affect (PBA) is a neurobehavioral syndrome involving episodes of incongruent, inappropriate, or heightened affect. PBA has been observed in the context of neurologic disorders including common conditions in rehabilitation settings like traumatic brain injury (TBI) and stroke (CVA). The proportion of TBI and CVA cases meeting criteria for PBA has ranged from 4.3 to 27.6 and 15.5 to 48.2, respectively, depending on criterion cutoff (Work et al., 2011). This study examined unique patient visits over a 6-year period to determine how frequently PBA was identified in populations known to exhibit high incidence of this condition.

Participants and Methods: Unique patient counts at a large academic medical center in the Mountain West were retrospectively queried from 2012-2017 using the visit diagnosis of PBA and frequently comorbid conditions. Comorbidities of interest were CVA and TBI. PBA patient counts were examined in relation to patient counts with CVA and TBI as visit diagnoses. The relative proportion of PBA visits was examined in relation to published findings on proportion of CVA and TBI patients meeting criteria for PBA.

Results: Unique patient counts varied by condition per year with relatively low counts for PBA (M = 38.2, SD = 17.2; range 13-61) across all years sampled. In contrast, a significant number of unique TBI (M = 264.8, SD = 111.2; range 103-381) and CVA (M = 2620.8, SD = 299.8; range 2279-3118) cases were observed. Given observed TBI cases, the estimated proportion of cases meeting PBA criteria is expected to range from 41 to 128. Given observed CVA cases, the estimated proportion of cases meeting PBA criteria is expected to range from 113 to 723. Overall, unique PBA counts ranged from 13 to 61, while expected counts for TBI and CVA combined ranged from 154 to 851.

Conclusions: Preliminary findings from one academic medical center over a 6-year period indicate the diagnosis of PBA to be lower than expected based on published findings of PBA prevalence in cases involving CVA or TBI.

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L. DORRIS, D. YOUNG, J. BARLOW, K. BYRNE & R. HOYLE. Human Cognitive Empathy Across the Lifespan.

Objective: We report the first study establishing normative developmental data on cognitive empathy with a large cohort, using a standardized measure of cognitive empathy ability.

Participants and Methods: Participants (n=4545, aged <5 years to >75 years, 60% female) were visitors to the "Mindworks" exhibition at the Glasgow Science Centre (Scotland, UK) over a sixteen-month period. Participation was voluntary; no identifying information was recorded other than age, sex and occupation. Participants completed a computerised version of the 'Reading the Mind in the Eyes Test'. This standardised test of cognitive empathy involves viewing the eye region of the human face and selecting a mental state term describing what the person was '*thinking or feeling*'.

Results: Cognitive empathy abilities show three distinct periods of rapid development in childhood and early-adulthood where performance is significantly greater than previous age bands; 6-7yrs (p=0.048), 10-12yrs (p=0.042), and 19-25yrs (p=0.001), after which performance remains stable across adulthood before substantially declining in people aged >70yrs (p=0.001). The most significant difference was between the 13-18yrs and 19-25yrs age groups, suggesting that late adolescence/early adulthood is a critical point at which cognitive empathy skills reach maturity. Females performed better than males at all ages (p<0.001); however, these differences were more prominent at several points across the lifespan.

Conclusions: These findings provide significant value in understanding the influence of age and sex on the development of cognitive empathy ability, and have clinical utility in identifying social-cognitive deficits using standardized tests. Our findings are discussed in relation to a range of clinical disorders across the lifespan where the use of cognitive empathy tests could support early diagnosis/detection. Understanding developmental issues in cognitive empathy could also influence approaches to moral and social education.

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S. ESBIT, K. LAFOLLETTE, R. BOTELLO, B.C. SATTERFIELD, A. ALKOZEI & W.D. KILLGORE. High Self-Perceived Adroitness: An Altered Perception of Reality During Sleep Deprivation.

Objective: Sleep deprivation (SD) degrades the ability to rapidly respond to stimuli. Often times, these objective measures of impairment do not coincide with self-reported sleepiness. Self-perceived invincibility may impact how humans respond to challenges, such as SD. The Invincibility Belief Index (IBI) was used to assess the relationship between self-perceived invincibility, objective alertness, and subjective sleepiness. The IBI is composed of three factors examining self-perceived invincibility: adroitness (i.e., mental/physical agility), audacity (i.e., self-assuredness), and impunity (i.e., immunity to consequences). We predicted greater adroitness scores would correlate with a higher self-perceived resistance to the adverse effects of SD but not with objective measures of alertness.

Participants and Methods: Forty-five healthy adults (25.4±5.6 yrs; 22 F) completed the IBI. Two weeks later, subjects returned to the lab for a 28 h overnight SD session. Hourly, from 19:00-12:00, subjects performed the Karolinska Sleepiness Scale (KSS), a subjective measure of sleepiness, and a 10 min Psychomotor Vigilance Test (PVT), a measure of alertness.

Results: Subjects were categorized into low (n=26) and high adroitness (n=18) according to IBI scores. ANCOVAs, controlling for sex, showed subjects in the high adroitness category had significantly lower KSS scores ($F(1,43)=4.610$; $p=0.038$) than the those in the low adroitness category. There was no difference between groups on PVT speed ($F(1,43)=0.177$; $p=0.676$).

Conclusions: Adults with high adroitness had lower subjective sleepiness yet did not differ in objective vigilant attention relative to those with low adroitness. High self-perceived adroitness may result in an altered perception of vulnerability to SD, or reduced willingness to report susceptibility. This false perception of reality may lead to higher risk-taking during periods of SD and may have severe consequences for occupations that operate around-the-clock including airplane pilots, truck drivers, or medical personnel.

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D.E. EVERHART, E. WATSON, A. NICOLETTA, A. WINTERS, T. ZURLINDEN & A. GENCARELLI. The Sleep Approach Avoidance Task (SAAT): Self-Reported Insomnia is Associated with Approach Motivation for Implicitly Presented Disturbed Sleep-Related Images.

Objective: Insomnia is associated with numerous public health consequences. The neurocognitive model of dysfunctional sleep posits that sleep impairment results from conditioned cortical, somatic, and cognitive arousal. This study explored the neurocognitive model via examination of insomnia, psychomotor vigilance, and approach/withdrawal tendencies associated with implicitly presented disturbed versus restful sleep images. It was hypothesized that insomnia would be related to approach-related bias for disturbed sleep images.

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Participants and Methods: Sixty-four (31 women) undergraduate students without significant medical history completed the Insomnia Severity Index (ISI), the PEBL Perceptual Vigilance Task (PVT) and the Sleep Approach Avoidance Task (SAAT) as part of a larger study. The ISI assesses severity of components of insomnia. The PVT is a psychomotor vigilance task that is sensitive to the neurocognitive effects of insomnia. The SAAT is a newly developed implicit reaction time task that measures approach or withdraw related tendencies in response to negative sleep-related stimuli (images depicting disturbed sleep) and positive sleep-related stimuli (images depicting restful sleep).
Results: Self-reported insomnia severity was associated with increased reaction time on the PVT, $r(61) = .25$, $p < .05$. Insomnia was also associated with approach bias for disturbed but not restful sleep images on the SAAT, $r(61), = .30$, $p = .01$). PVT and SAAT reaction times were not associated.
Conclusions: Consistent with previous findings, insomnia was associated with diminished performance on the PVT, reflecting neurocognitive alterations. As predicted, insomnia was moderately associated with approach bias for implicit images that depict disturbed versus restful sleep. The findings from this study provide initial support for further development of the SAAT as a measure of cognitive bias associated with insomnia. Implications fo neurocognition and sleep are discussed.
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L. THIBODAUX, E.L. FISHER & J. REESMAN. The Impact of Communication Mismatch on Parent Ratings in Clinically Referred Children Who Are Deaf or Hard of Hearing.
Objective: Children who are deaf or hard of hearing (D/HH) are rated as having increased social-emotional and behavioral (SEB) functioning difficulties than their hearing peers. Research suggests that parent-child communication influences the perception of SEB functioning. This study describes parent ratings of SEB and examined the impact of communication on these ratings in a clinically-referred sample of children who are D/HH on the Behavior Assessment System for Children (BASC)-2(3).
Participants and Methods: We conducted a retrospective review of a de-identified clinical sample of 157 children (N_{male}=99; M_{age}= 11.51, SD=3.25) who are D/HH and participated in evaluation at a large neuropsychology department with specialty service for children who are D/HH. Ratings of children's SEB functioning were obtained via parent report (BASC-2[3]). Descriptive statistics and proportions of the sample in the clinically significant range were examined.
Results: One sample t-tests indicated that *T-scores* for the total sample were significantly above normative means for SEB concerns (Internalizing Problems M=53.98, SD=12.44, t = 4.01; Externalizing Problems M=57.56, SD=12.46, t = 7.60; Behavioral Symptoms Index M= 60.16, SD=12.50, t = 10.18). The highest rates of clinically significant scores were on the Atypicality, Hyperactivity, and Withdrawal subscales. Parents of children with home and school communication mismatch (N=13), consistently rated less SEB symptoms compared to those with communication match (N = 29).
Conclusions: Results indicate children who are D/HH who present for clinical evaluation are rated higher on SEB functioning difficulties. Parents of children who had a mismatch of communication between home and school rated their children lower. Studies should examine item level parameters of SEB measures for children who are D/HH to determine if differential item functioning is present for D/HH children or subgroups of children.
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K. GALLAGHER, C. BACON & K. INGRAM. The Relationship Between Service-Related Conditions and Quality of Life in Female Military Veterans.
Objective: Researchers have examined the relative contribution of service-related conditions, such as mTBI, depression, and PTS to ongoing symptoms reported by veterans (e.g. Storzbach et al., 2015). Few studies have examined outcomes, such as quality of life (QoL) and its relationship to these commonly diagnosed service-related conditions. Additionally, although the relationship between resilience and QoL has been examined in various clinical populations (e.g. Lee et al., 2017; Calvete et al., 2018), it hasn't been explored in the context of service-related conditions, especially in female military veterans. The purpose of this study is to examine the relationship between common service-related diagnoses (mTBI, PTS, and Depression), resilience, and QoL in female veterans.
Participants and Methods: An anonymous online survey was advertised through closed social media veterans' groups. A total of 80 female veterans participated. The survey included demographic, medical, and service-specific questions along with the 25-item Connor-Davidson Resilience Scale (CD-RISC; Davidson & Connor, 2018) and the 16-item QoL Scale (Buckhardt & Anderson 2003). Depression, mTBI, PTS, age, and CD-RISC scores were included in correlational analyses. Significantly correlated variables (Depression and CD-RISC scores) were entered as predictor variables in a multiple linear regression with QoL Scale score as the Dependent Variable.
Results: The model was significant (R^2_{adj}=.648, $F(2, 77)$=73.62, $p < .001$). Only CD-RISC score significantly predicted QoL score, (β =.753, t =10.02, $p < .001$). Greater resiliency predicted better quality of life. Depression did not significantly predict QoL.
Conclusions: Results provide evidence that greater resilience predicts a better quality of life in female veterans, even when depression is included as a covariate. Future research should focus on examining the efficacy of resilience training on QoL in female veterans.
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M. KRYZA-LACOMBE, D. ALSAIGH, M. GRATALO, N. AMIR & J.L. WIGGINS. Executive Functioning and Neural Mechanisms of Reward Processing in Early Adolescence.
Objective: Executive functioning (EF) deficits and difficulty adjusting to reward contingencies in youth are associated with concurrent and future psychopathology. Neural sensitivity to reward and punishment may be related to internalizing/externalizing symptoms, and cognitive flexibility, a subdomain of EF, to internalizing symptoms. EF may mediate reward processing deficits, yet little is known about this. This study examined the relationship between cognitive flexibility and neural mechanisms of reward processing.
Participants and Methods: Adolescents (n=22), ages 11-14, completed a youth-friendly monetary incentive delay task during multiband fMRI acquisition by hitting a piñata target via button press, to obtain a potential reward. The task included anticipation and feedback periods. On the same day, youths also completed the Dimensional Change Card Sort Test (DCCST; NIH Toolbox) on an iPad. Whole-brain analyses evaluated brain activation associated with DCCST scores during anticipation and feedback periods.
Results: DCCST performance is associated with left insula activation during feedback (xyz=-35,11,10, $F(1,20)$=25.36, p<.005, uncorrected, k=30). Post-hoc analyses revealed that lower DCCST scores predicted higher activation in left insula when participants failed to obtain a potential reward (r=-.52, p=0.014). During reward anticipation, a significant interaction emerged between reward vs. no reward conditions and DCCST scores in the left fusiform gyrus (xyz=-45,-41,-16, $F(1,20)$=23.94, p<.005, uncorrected, k=38) and left inferior frontal gyrus (xyz=-39,33,10, $F(1,20)$=16.86, p<.005, uncorrected, k=21), but post-hocs were non-significant.

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Conclusions: These preliminary results suggest that EF may moderate reward-related neural activation in areas suggested to be part of a stimulus-driven attentional network. Subjects with lower cognitive flexibility may have difficulty reframing failure when a reward is missed. Understanding these mechanisms may inform intervention efforts to improve short and long-term outcomes.

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K. LAFOLLETTE, B.C. SATTERFIELD, M. LAZAR & W.D. KILLGORE. Predicting Psychosocial Stress Reactivity from Ability and Trait-Based Emotional Intelligence.

Objective: Emotional intelligence (EI) is regarded as both an ability and stable personality trait that contributes to successful social exchanges. While many studies have investigated the positive attributes of EI, few have considered the negative impact that EI may have in these exchanges. We aimed to elucidate this gap in the literature by examining EI in the context of hypothalamic-pituitary-adrenal (HPA) axis expression in a socially evaluative situation, termed psychosocial stress.

Participants and Methods: 44 healthy adults (21.6±2.9 y; 30 F) participated in this study, completing the Mayer-Salovey-Caruso EI Test (MSCEIT) and the Emotional Quotient Inventory 2.0 (EQI) to test for ability and trait-based EI. Acute psychosocial stress was induced via a modified Trier Social Stress Task (TSST), an ecologically validated social stressor. Salivary cortisol concentrations were sampled pre and post TSST speech administration to assess stress reactivity. All cortisol means were log 10 transformed to adjust for positive skew.

Results: Bayesian exploratory factor analysis was used to account for multicollinearity between MSCEIT and EQI subscales. 8 latent factors were determined stochastically during Markov chain Monte Carlo sampling. These 8 factors were used as predictors in a linear regression model predicting cortisol delta. Two of the 8 identified factors were significant predictors of stress reactivity ($F(8, 35) = 3.069$, $p<.01$, $R^2=0.412$). The first factor loaded with the MSCEIT Experiential Area components (ß=0.15, $p<.01$), and the seventh loaded with the EQI Interpersonal composite score and two subscales (ß=0.22, $p<.05$).

Conclusions: Participants with higher scores in both the MSCEIT Experiential Area and EQI Interpersonal Area were significantly more stress reactive to the TSST. These findings support the notion that higher scores on some facets of EI can have negative implications for psychosocial health and social cognitive functioning, despite extensive benefits reported for other areas.

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K. LAFOLLETTE, B.C. SATTERFIELD, M. LAZAR & W.D. KILLGORE. Stay Negative?: Positive Affect is Associated with Increased Psychosocial Stress Reactivity.

Objective: While the consequences of acute stress on affect and mood are well researched, the potential for a bidirectional relationship between mood and stress has not been thoroughly explored. Here we investigate this proposed relationship by assessing the effects of an adapted mood induction procedure on hypothalamic-pituitary-adrenal axis response to a later administered social stress task. We hypothesized that positive mood induction would increase resilience to future stress, whereas negative mood induction would increase susceptibility.

Participants and Methods: 55 healthy adults (21.4±2.9 y; 38 F) participated in this study. To induced stress, participants were subjected to a modified Trier Social Stress Task (TSST), an ecologically validated social stressor. A positive, negative, or neutral mood was reinforced regularly through a mood induction protocol. Salivary cortisol concentrations were sampled pre and post TSST speech administration to assess stress reactivity. All cortisol means were log 10 transformed to adjust for positive skew. Mood was regularly assessed with a visual analogue scale (VAS).

Results: A one-way ANOVA confirmed that mood condition significantly affected VAS Happiness and, Sadness scores ($F(1,55)\leq5.302$, $p\leq0.025$). Interestingly, mood condition had no direct effect on stress reactivity while each VAS measure was found to be strongly correlated with stress reactivity ($r\geq abs(0.318)$, $p\leq0.02$), such that increased happiness was associated with greater stress reactivity, and vice versa for sadness.

Conclusions: Participants with high self-reported happy affect showed counterintuitively higher stress reactivity, compared to those with a sad affect. However, induced mood condition itself was not directly related to stress reactivity, and may thus serve only as a mediator between affect and stress response. This suggests that emotional state priors could influence future stress reactivity. Future studies should investigate the cognitive/behavioral effect of positive affect in the face of acute stress.

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E. LEBLANC, F. DÉGEILH, A. BERNIER, V. DANEAULT & M. BEAUCHAMP. Prospective Association Between Attachment Disorganization in Infancy and Brain Morphometry in Late Childhood.

Objective: Infants rely largely on their parents for their emotional needs. Those exposed to suboptimal parenting are likely to develop disorganized attachment relationships, which are presumed to impair their brain development. Attachment security (vs. insecurity) in infancy is associated with larger grey matter volume in frontal and temporal brain regions in late childhood (Leblanc et al., 2017). Little is known, however, about brain development and the most extreme form of attachment insecurity, disorganized attachment. This study aimed to examine the links between infants' disorganized attachment behaviors toward their mothers and whole-brain regional grey matter volume and cortical thickness in late childhood.

Participants and Methods: Thirty-three children and their families took part in this study. The Strange Situation Procedure (Ainsworth et al., 1978) was used to assess parent-child attachment when infants were aged 18 months (M = 18.1; SD = 0.8). Children underwent structural MRI at 10 years of age (M = 10.6; SD = 0.5). Hierarchical regressions were performed in CAT12 (MATLAB) to predict whole-brain regional grey matter volume and thickness from attachment disorganization in infancy, controlling for child age, sex, and maternal education.

Results: Results indicate that infants who exhibited more disorganized attachment behaviors had significantly greater cortical thickness in the bilateral orbitofrontal cortex, superior and middle frontal gyri, as well as in the left insula and the superior and middle temporal gyri in late childhood. Disorganized attachment was not associated with grey matter volume.

Conclusions: These results are the first to indicate that disorganized attachment may influence the development of cortical thickness in children, mostly in brain regions involved in socio-emotional processes.

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N. SHARIFIAN, A.Z. KRAAL, A.B. ZAHEED, K. SOL & L.B. ZAHODNE. The Longitudinal Association between Social Network Composition and Episodic Memory in Older Adulthood: The Importance of Social Engagement with Friends.

Objective: The composition of one's social network has been associated with cognitive functioning such that a greater proportion of family is associated with worse global cognition compared to a greater proportion of friends. It is not clear whether this association between network composition and cognitive aging is driven by potential negative effects of family interactions or positive effects of interactions with friends. Thus, the current study examined whether the relationship between composition and episodic memory was driven by social engagement with friends or family.

Participants and Methods: Using data from the Health and Retirement Study (2006–2014; n=10,803; M_{age}=68.48, SD=10.89 at baseline), a

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longitudinal mediation model was conducted to test the direct and indirect effects of composition on episodic memory and latent change in memory through engagement with friends and family.
Results: Analyses revealed indirect effects of composition on both memory and latent change in memory through social engagement with friends. Specifically, a greater proportion of family in one's network was prospectively associated with lower social engagement with friends and in turn, lower memory. Composition was also prospectively associated with higher social engagement with family, however, social engagement with family was not associated with memory.
Conclusions: These findings suggest that spending time with family is unlikely to affect episodic memory in older adulthood but spending time with friends may be beneficial. Potential mechanisms and implications for interventions targeting modifiable social resources are discussed.
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E. STONE, E. VAKIL, J. DELUCA & H. GENOVA. "Facial Affect Recognition Differences in Individuals with MS: A Pilot Study Using Eye-Tracking"
Objective: Individuals with Multiple Sclerosis (MS) are impaired on a number of social cognition tasks, including Facial Affect Recognition (FAR). It is unclear why these deficits exist, however, one hypothesis is that their eye gaze patterns during examination of emotional stimuli are different compared to healthy adults (for example, they may not look at regions of the face which are critical to identification of emotions). Thus, in the current pilot study, we examined impairments in FAR in relation to the gaze patterns of subjects viewing emotional faces using eye tracking.
Participants and Methods: A small sample of MS and healthy control (HC) subjects performed two emotional processing tasks. In the Full Attention task, subjects viewed faces and were asked to identify the emotion presented. In the Divided Attention task, subjects viewed faces while simultaneously categorizing auditory tones and identifying the emotion presented.
Results: We examined gaze patterns in several regions of interest (ROI) on the facial stimuli, including the eye, nose, and mouth regions. Independent sample t-tests were performed to examine group differences in dwell time and fixations in each ROI, as well as behavioral performance. We observed differences in both gaze patterns and performance on the tasks, in that individuals with MS performed worse on the facial affect recognition tasks (i.e. lower accuracy and slower reaction time). In addition, MS subjects spent less time gazing on the eye region compared to HCs.
Conclusions: These findings suggest that individuals with MS spend less time looking at the eye regions of the face compared to HCs. Group differences in eye gaze patterns were greater when attention was divided. This reduction in gaze in the eye region may contribute to their FAR deficits because they are not properly recognizing the emotions being expressed from eyes. Future research in facial affect recognition abilities in MS should take into account eye gaze patterns.
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J.R. VANUK, R. SMITH, A. RAIKES, A. ALKOZEI, J. SKALAMERA & W. KILLGORE. Ability-Based Emotional Intelligence is Associated with Greater Cardiac Vagal Tone.
Objective: The Ability Model of Emotional Intelligence (EI) conceptualizes EI as a set of interconnected cognitive-emotional abilities, including the ability to perceive, manage, and understand the emotions of the self and others. The neurovisceral integration (NVI) model proposes a positive relationship between cardiac vagal tone (CVT) and similar cognitive-emotional abilities. However, the relationship between EI scores and CVT has yet to be examined directly. CVT can be estimated using the root mean square of successive differences (RMSSD) in heart beat intervals. The current study examined the association between CVT and EI. We hypothesized that individuals with greater levels of RMSSD at rest, and in response to a stressful task, would have higher EI scores.
Participants and Methods: One hundred thirty-five healthy adults (48 men), ranging in age from 18-38 years, underwent a reactivity assessment comprised of two five-minute resting periods separated by a 90-second serial subtraction challenge. Participants also completed the *Mayer-Salovey-Caruso Emotional Intelligence Test* (MSCEIT), which assesses the EI abilities described above.
Results: We found significant positive associations between RMSSD at rest and MSCEIT scores, including those associated with overall EI (p=.045), as well as the with the abilities to understand (p=.045) and reason about (p=.024) emotions. We also found significant interactions between RMSSD during the reactivity assessment and overall EI (p=.036), as well as with the specific abilities to manage (p=.045), and reason about (p=.019) emotions.
Conclusions: Consistent with expectations, higher levels of RMSSD were associated with higher levels of EI. Our findings support the theoretically expected overlap between constructs within the NVI and ability EI models. Preliminary findings from our lab suggest that EI is malleable and can be improved through psychoeducation. Further work will be necessary to examine whether improvements in EI can also lead to subsequent increases in CVT or vice versa.
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Mood & Anxiety Disorders

D. ABDULLAH, R.J. RICHARDSON & J.E. CASEY. The Association Between Emotions, Working Memory, and Executive Functioning in an Undergraduate Population.
Objective: Evidence indicates that depression and anxiety are among the most common health problems for university students and are linked to poorer academic performance. This may be due in part to the relation between depressive and anxiety disorders and cognitive dysfunction (e.g., Castaneda et al., 2008). Whereas neuropsychological dysfunction is often seen in major depressive disorder in adults, limited data has been published on university students. The current study aimed to elucidate the relation between psychosocial adjustment and both working memory and executive functioning in an undergraduate population. It was predicted that self-reported depressive, anxious, and stress symptoms would be associated with greater cognitive and executive dysfunction.
Participants and Methods: Participants consisted of undergraduate students (N = 84, 78% female) aged 17 to 25 years (M_{age} = 20.3 years). Participants completed a battery of measures designed to assess their current depressive and anxious symptomology (DASS-21), executive functioning (BRIEF-A), visual and verbal working memory (WRAML-2), and estimated intelligence (WTAR).
Results: Multiple regression analyses revealed that only anxiety significantly predicted verbal working memory ($\beta = -.455$, $p < .006$), but stress, anxiety, and depression did not predict visual working memory ($p > .05$). After controlling for intelligence, stress was a significant predictor of executive dysfunction ($\beta = .405$, $p = .009$). Subsequent analyses indicated that stress predicted problems regulating behaviour ($\beta = .370$, $p = .005$), but not problems regulating thoughts ($p > .05$).
Conclusions: The findings support previous research indicating that mental health variables were associated with undergraduates' working memory and executive functioning abilities. Poorer academic performance may be exacerbated by difficulties with verbal working memory and behavioural regulation among those with stress and anxiety. Universities should place more emphasis on student wellbeing to improve overall learning.
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K.L. BESSETTE, N. CRANE, S. POCIUS, J. ZUBIETA, S. WEISENBACH & S.A. LANGENECKER. Differing Neurocognitive Subtypes of Depression using Inhibitory Control.

Objective: Major Depressive Disorder (MDD) is a heterogeneous disease with tremendous impact upon the life course. While symptom-based subtypes have led to few innovative breakthroughs, neurocognitive metrics may lead to greater insight into the neurobiology of this disease. Importantly, high inhibitory control (IC) is a well-known neurocognitive predictor of treatment response in MDD, whereas low IC predicts recurrence. Here, we examine how individuals with MDD who differ in IC performance recruit important neural networks during successful and unsuccessful aspects of an inhibitory neuroimaging task.

Participants and Methods: Two-hundred and two adult participants completed the Parametric Go/No-Go task during functional MRI. From this sample, 98 healthy controls were used to determine median correct inhibition on this task (66%), and to split 104 MDD individuals into High (n = 45) and Low IC (n = 59). Next, t-tests controlling for sex, age, and movement translations was conducted in SPM8 with these MDD subtypes to examine significant associations of neural functional activation during commissions and correct rejections ($p < .005$, $k > 57$).

Results: During commissions, High IC MDD individuals exhibited greater activation of bilateral insula, inferior parietal lobule, dorsal anterior cingulate and right middle frontal gyrus. During correct rejections, Low IC MDD individuals showed greater recruitment of frontal regions, including right ventral, medial, and left ventral inferior frontal gyri, and right ventral putamen.

Conclusions: Individuals with MDD may be subclassified into low and high IC performers, who show differing neurocognitive profiles. Low IC MDD individuals appear to recruit more cognitive control regions when successfully inhibiting prepotent responses, whereas High IC MDD individuals recruit cognitive control and salience-emotion regions during errors, potentially enabling better adaptation and task performance overall.

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S.A. BOTTARI & E.B. RAPOSA. Affect Recognition Deficits in Adolescents with Depressive Symptoms.

Objective: Previous research has suggested that adults with depression and anxiety disorders demonstrate a clear deficit in affect recognition, which may contribute to their impaired social functioning. However, research in depressed adolescent populations has yielded conflicting findings. Moreover, few studies in adolescents have examined the role of anxiety symptoms, which often co-occur with depression, in affect recognition. The present study aims to clarify the relationship between affect recognition and internalizing symptoms in a community sample of adolescents.

Participants and Methods: Participants included 22 adolescents aged 14-16 (64% male) recruited from a Virginia community. The adolescents completed two measures of internalizing symptoms, the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) and the Anxiety Sensitivity Index (ASI; Reiss et al., 1986). Then, the affect recognition subsection of the NEPSY-II neuropsychological assessment (Korkman, Kirk, & Kemp, 2007) was administered to test facial emotion recognition abilities.

Results: A linear regression analysis co-varying for gender showed that adolescents who endorsed a score on the CES-D that indicated greater levels of depressive symptoms exhibited a significantly poorer performance on the affect recognition task (b = 2.22, p = .04). Scores on the ASI did not predict performance on the affect recognition task (b = 2.08, p = .09).

Conclusions: Results suggest that consistent with findings in adult populations, adolescents with high levels of depressive symptoms demonstrate deficits in affect recognition. These deficits help to explain the social impairments seen in teens with depression and present a target for intervention and treatment that could be used to support recovery in this population. Further, the fact that they are detectable in subclinical, community populations of adolescents suggests that affect recognition tests might be able to identify individuals at risk for depression well before the onset of clinical disorder.

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C. BURLEY. Reported Depressive Symptom Differences in Individuals with High and Low Right Frontal Lobe Activation.

Objective: To determine differences in self-reported depressive symptoms between individuals with high and low right frontal lobe activation, as measured by SPECT neuroimaging.

Participants and Methods: Participants (n=3,072) were selected from a de-identified, archival database according to the top 10 percent and bottom 10 percent of right frontal lobe activation during a concentration task (Conners CPT). The sample included 1,595 males (51.9%), and 1,962 Caucasians (63.8%), ranging from ages 18 to 88 (M=41.28, SD=17.02). Patients were asked to complete a checklist in which they rated symptoms on a Likert scale. Controlling for age and gender, repeated analyses of covariance (ANCOVAs) tested for main effects of high and low cerebral perfusion on responses pertaining to depressive symptoms. All statistical analyses were conducted at an alpha of .005.

Results: Initial analyses indicated that groups differed significantly by gender ($F(1, 3071)=524.782$, $p<.001$) and age ($F(1, 3071)=1,153.617$, $p<.001$). Results of multiple ANCOVAs using age and gender as covariates revealed significant differences between groups on the following items: frequent feelings of sadness ($F(1, 3071)=25.869$, $p<.001$), low energy ($F(1, 3071)=11.051$, $p=.001$), decreased interest in other people ($F(1, 3071)=23.070$, $p<.001$), feelings of hopelessness ($F(1, 3071)=19.249$, $p<.001$), suicidal feelings ($F(1, 3071)=19.365$, $p<.001$), and crying spells ($F(1, 3071)=13.861$, $p<.001$). In all analyses, the low right frontal lobe activation group reported feeling the symptoms more frequently than the high group.

Conclusions: On average, the low right frontal lobe activation group reported feeling symptoms of depression more frequently than the high right frontal lobe activation group. Results suggest that hypoperfusion in the right frontal lobe may indicate an increased likelihood of experiencing depressive symptoms. Future research should aim to further elucidate the role of right frontal lobe perfusion in depression.

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A.I. BURNS, K.C. SHEPARD, M. OZCAN, A. ALKOZEI, J. VANUK & W. KILLGORE. The Association Between PTSD Severity and Life Satisfaction is Mediated by Trait Gratitude.

Objective: Higher levels of trait gratitude (i.e. the ability to identify and appreciate positive aspects in one's life) have been associated with increased satisfaction with life (SWL) and lower levels of psychopathology. Even in individuals with post-traumatic stress disorder (PTSD), higher trait gratitude has been shown to predict lower PTSD symptom severity over time. However, it is not known whether gratitude can explain the relationship between PTSD symptom severity and SWL in this clinical population. We hypothesized that trait gratitude would mediate the relationship between PTSD symptom severity and SWL in individuals with PTSD.

Participants and Methods: Fifty-two individuals (53.7% female, Mean age =30.66, SD =8.15) with a clinical diagnosis of PTSD were administered the Clinician-Administered PTSD Scale for DSM-5 as a measure of PTSD symptom severity. Participants also completed the Gratitude Questionnaire-6 as a measure of trait gratitude and the Satisfaction With Life Scale as a measure of their satisfaction with life as a whole. A mediation analysis using Hayes' PROCESS tool in SPSS was conducted to explore the hypothesis that trait gratitude would mediate the relationship between PTSD symptom severity and SWL.

Results: As expected, trait gratitude partially mediated the negative relationship between PTSD symptom severity and SWL (*b*=.32, 95% *CI*[-.69,-.08]).
Conclusions: The relationship between PTSD symptom severity and SWL can, in part, be explained by an individual's level of trait gratitude. These findings may be explained by the impact of trait gratitude on one's cognitive style, including the ability to positively reframe negative situations, and its influence on self-reported self-esteem, both of which are often negatively impacted by traumatic experiences. These findings suggest a potential utility for gratitude training interventions as an adjunctive treatment approach for PTSD.
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R.E. EASTER, K. BESSETTE, S. POCIUS, S. DELDONNO, K. RYAN & S.A. LANGENECKER. Do Individuals with Remitted Major Depression Still Exhibit an Effect of Gender on Facial Emotion Perception?
Objective: Prior research has found high accuracy in perception of negative emotions (e.g. sadness, fear, anger) in individuals with remitted major depression (rMDD) compared to healthy controls (HC). Additionally, research has found consistent effects of gender on emotion perception, such that women are more accurate at identifying others' emotions than men. Additionally, prior research has shown that men are more accurate at identifying emotions on male faces than on female faces. However, women did not demonstrate a difference in accuracy identifying emotions on male versus female faces. In this study, we investigate the effect of participant gender and gender of the stimuli on emotion perception in HC and an rMDD sample to examine whether the effects of gender persist in remitted depressed individuals.
Participants and Methods: 189 individuals diagnosed with rMDD and 103 HC completed the Facial Emotion Perception Test - a computerized test of facial perception of happiness, sadness, anger, and fear.
Results: We conducted preliminary analyses with a subsample using a generalized mixed effects model. The preliminary analyses found that the remitted depressed group was significantly more accurate at identifying negative emotions than healthy controls. Additionally, preliminary analyses found a significant interaction between participant gender and stimuli gender, such that women were equally accurate at identifying male and female faces, but men were less accurate at identifying the emotions on female faces compared to male faces. Preliminary analyses did not find a significant three-way interaction between diagnosis, participant gender, and stimuli gender.
Conclusions: Based on preliminary analyses, results were consistent with previous findings that diagnosis and gender are significant predictors of emotion perception. Additionally, we found that the effect of gender persisted in the rMDD group, suggesting that a remitted diagnosis of major depression does not supersede the effects of gender in facial emotion perception.
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Y.A. EHRLICH & D.J. WALDER. Dermatoglyphic Measures in Relation to Depressive Symptoms Among Non-Clinical Adolescents and Young Adults.
Objective: Depressive symptomatology is increasingly understood from a dimensional perspective such that non-clinical presentations may share a similar etiology with the clinical disorder. Depression etiology is believed to include genetic and environmental factors that may contribute to underlying vulnerability by way of neurodevelopment. Birth cohort studies have provided empirical evidence of the relationship between prenatal insult and increased risk for depressive disorders. Dermatoglyphic measurements offer an indirect proxy for estimating prenatal insult that are less methodologically limited than retrospective investigation. Digit dermatoglyphics refer to fingerprint fluctuating asymmetry (FA) and ridge counts. Fingerprints develop concurrently with brain structures implicated in risk for depression. Thus, dermatoglyphic abnormalities may illuminate the potential contribution of prenatal insult to later expression of depressive symptoms. The current investigation assessed the predictive relationships among dermatoglyphic measures and depressive symptom endorsement in a non-clinical sample from the general population.
Participants and Methods: Participants included $n = 53$ (22 M / 31 F) adolescents and young adults ($M_{age} = 20.04$, $SD_{age} = 1.05$). FA and ridge counts were measured via fingerprints, and depressive symptoms were assessed using the BDI-II. Multiple regression analyses were used to measure predictive relationships among dermatoglyphic indices and depressive symptoms.
Results: In line with hypotheses, one index of FA significantly positively predicted depressive symptoms ($\beta = 1.44$, $p = .01$) after Bonferroni correction, whereas other dermatoglyphic indices did not.
Conclusions: Findings suggest that neurodevelopmental factors may contribute to depressive symptoms, support the utility of dermatoglyphics as a proxy for prenatal insult, and provide further evidence for the dimensional perspective of depressive experiences. This research has potential implications for understanding depression etiology and risk.
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K.F. HATCHER, N.E. WADE, S.M. LEHMAN, K.A. LEER & K. LISDAHL. Gender Moderates the Impact of Aerobic Fitness on Mood and Executive Dysfunction.
Objective: Aerobic fitness has been linked with brain health and mood in older adults but less is known in adolescents and young adults. The aim of this study was to examine the relationship between aerobic fitness (VO2 maximum), mood, and executive functioning in youth and to test whether gender moderated these effects.
Participants and Methods: 65 youth (33F) ages 16-26, with low levels of lifetime substance use, were included in this study. Participants were administered a psychological battery to assess mood, perceived stress, reward sensitivity, and executive functioning including Beck Depression Inventory-II (BDI-II), Behavioral Inhibition System (BIS), Behavioral Approach System (BAS), Frontal Systems Behavioral Scale (FrSBe), State Trait Anxiety Inventory (STAI), and Perceived Stress Scale (PSS). Fitness levels were based on VO2 max scores corrected for age and gender and included 27 high fit (11F, 16M) and 38 low fit participants (22F, 16M).
Results: The interaction of VO2 max and gender was significantly associated with BDI-II (t=2.02, p=.05) (females demonstrated positive relationship and males had the opposite) and FrSBe executive dysfunction (t=1.64, p=.01) (greater aerobic fitness correlated with executive dysfunction decrease in females and increase in males). Increased VO2 max was significantly associated with greater FrSBe disinhibition (t=3.93, p=.0001) and marginally with greater BAS reward responsiveness (t=1.64, p=.10).
Conclusions: Gender moderated the relationship between aerobic fitness, mood, and executive functioning. Fit females had higher levels of depression but lower of executive dysfunction, while males demonstrated the opposite pattern. In both genders, greater aerobic fitness was correlated with increased levels of disinhibition and marginally increased reward responsiveness. Longitudinal studies are needed to examine causality in the relationships between aerobic fitness, mood, and executive functioning in youth.
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K.M. HEILMAN & I.S. FISCHLER. Left Eye Dominance and Anxiety.

Objective: The right hemisphere controls the sympathetic nervous system, which plays an important role in mediating anxiety and fear. Each eye projects to the occipital lobe of both hemispheres; however, each eye also primarily projects to the contralateral colliculus. Each colliculus then projects to the ipsilateral pulvinar, which projects to the areas in the parietal and frontal cortex important for hemispheric arousal. The superior colliculus also projects to the amygdala. Prior research has revealed that with left eye viewing there is increased right hemispheric activation and pupillary dilation. The goal of this research was to learn if left (or right) eye dominance is associated with increased anxiety.

Participants and Methods: Undergraduate college students (N = 289) were asked to determine their eye dominance using the aperture method on three trials. All those who brought the hole to the same eye (right or left) in all three trials were considered left or right eye dominant. Participants were also given a brief anxiety scale to complete.

Results: Roughly three times as many participants were right eye than left eye dominant. Participants who were left eye dominant (n = 47) had a higher anxiety score than did three successive groups of right eye dominant participants of similar sample size (one-tailed t-test p = .10, .02 and .04 respectively).

Conclusions: Future studies should replicate these findings, and learn if patients with anxiety disorders and post-traumatic stress disorder have a higher rate on left eye dominance, and if alteration of eye dominance can reduce anxiety.

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M. KAGIWADA, T. LIBERTA, A. SACKS-ZIMMERMAN, J. SPAT-LEMUS & K. PERRINE. Moderating Impact of Anxiety on the Effectiveness of a Computerized Working Memory Intervention on Auditory-Verbal Memory.

Objective: Cognitive difficulties are frequently reported following neurosurgical intervention, regardless of etiology. Of these, working memory (WM) deficits impair an individual's ability to efficiently encode and retrieve auditory-verbal (AV) information, diminishing their functioning. A concomitant symptom is anxiety, which extant literature has demonstrated to further exacerbate AV memory deficits, thus undermining neurocognitive treatment. Therefore, the goal of this study was to examine the potentially moderating effects of anxiety on AV memory following a WM intervention among the neurosurgical population. The first and second hypotheses were that those with low levels of anxiety would demonstrate greater improvements in AV memory (encoding and retrieval, respectively) than those with high anxiety following a WM intervention.

Participants and Methods: Participants included English-speaking individuals free of psychiatric history who underwent neurosurgical intervention (N = 20; age 18-74, 55% female), regardless of etiology. Prior to completing a 5-week computerized WM intervention, participants were administered the Rey Auditory Verbal Learning Test (RAVLT) to measure AV learning efficiency, as well as the Beck Anxiety Inventory (BAI) to assess anxiety level in order to assign membership to either a low or high anxiety group. Following the intervention, AV memory was reassessed using an alternative RAVLT to examine potential changes from baseline using a Mann-Whitney U test.

Results: Age-corrected scaled scores revealed an association between low anxiety and greater improvements in AV memory (both encoding and retrieval) following a WM intervention (all $p < .05$).

Conclusions: Anxiety had a moderating role in the effectiveness of a WM intervention when assessing AV memory in neurosurgical patients. The results demonstrate the importance of assessing anxiety prior to neuropsychological treatment, as it may adversely impact its efficacy.

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H.R. MICHALAK, T. KING, J.A. TURNER, E. SEMMEL & V. DOTSON. Dimensions of Depression and Cerebellar Subregion Volumes in Older Adults: A Pilot Study.

Objective: The cerebellum is best known for its role in motor function; however, there is also evidence that the posterior cerebellum is involved in emotion. In particular, vermal areas VI and VII have been associated with emotion processing and empathy. Little is known about the relationship between symptom dimensions of depression and cerebellar sub-regions, therefore we examined the relationship between subthreshold depressive symptoms and the volumes of vermal regions VI and VII in a population of late-middle to older adults.

Participants and Methods: A community sample of 14 adults aged 51 to 75 years of age (M = 65.5; SD = 6.42) received 3-tesla magnetic resonance imaging scans and completed the Center for Epidemiologic Studies Depression Scale (CES-D). The SUIT Toolbox in SPM was used to parcellate subregions of the cerebellum. CES-D subscale scores for depressed mood, somatic symptoms, and lack of positive affect were calculated, and multiple regression analyses were used to examine the relationship between symptom dimensions and vermal volumes while controlling for sex and age.

Results: Higher total depressive symptoms were associated with larger volumes in vermal regions VI and VII. Additionally, higher scores on the lack of positive affect subscale were associated with larger volumes in vermal region VI. Vermal region VII did not have a significant relationship with any CES-D subscales.

Conclusions: These findings contribute to our understanding of the neural correlates of sub-clinical depressive symptoms in an aging population, and provide further evidence that the vermis of the posterior cerebellum is linked to mood symptoms. Furthermore, this adds to our knowledge regarding the distinct relationships that different dimensions of depression have with the brain. Future work will examine these relationships in a larger sample.

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K.C. SHEPARD, M. OZCAN, A.I. BURNS, A. ALKOZEI, J. VANUK & W. KILLGORE. Trait gratitude and the impact of excessive daytime sleepiness on daily functioning predict PTSD severity over time.

Objective: Individuals with post-traumatic stress disorder (PTSD) also often report symptoms of anxiety, depression, and poor sleep quality. It has been suggested that higher emotional resilience, better sleep quality, and higher trait gratitude may be protective factors for PTSD severity. Here, we explored several of these potential protective factors of PTSD severity over time.

Participants and Methods: Forty-six individuals (52% female, M_{age}=31.57, SD=8.91) with a clinical diagnosis of PTSD were administered the Clinician-Administered PTSD Scale for DSM-5 (CAPS) to determine PTSD symptom severity at time 1 (T1) and after six weeks of light therapy (time 2; [T2]). Participants completed the Gratitude Questionnaire (GQ-6), the Functional Outcomes of Sleep Questionnaire (FOSQ), the Connor-Davidson Resilience Scale (CD-RISC), the Beck Anxiety Inventory (BAI) and the Beck Depression Inventory (BDI-II) at T1 and T2. A hierarchical regression to was run using SPSS with CAPS severity at time 2 as the outcome variable. CAPS severity at time 1 was entered in the first step, and GQ6, FOSQ, CD-RISC, BAI, BDI-II scores at time 1, and age and gender were entered as the second step in a stepwise fashion.

Results: Participants showed a decrease in PTSD severity over time (T1 M=33.02, SD=8.65; T2 M=22.77, SD=12.59). For the group as a whole, CAPS severity at T1 was a significant predictor of CAPS severity at T2, explaining 63% of the variance (R^2=.631, p< .001). The inclusion

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of FOSQ and GQ6 scores at T1 explained an additional 4% of the variance in CAPS scores at T2 (R^2= .719, p< .001).
Conclusions: Individuals with PTSD who experienced fewer disruptions to their daily life activities due to excessive daytime sleepiness, and who felt more gratitude at the start of the light exposure treatment were more likely to exhibit lower PTSD severity over time. As such, interventions targeting PTSD severity would benefit from integrating exercises aimed at improving sleep quality to lower excessive daytime sleepiness and increasing gratitude.
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A.T. PETERS, X. REN, K. BESSETTE, B. GOLDSTEIN, A. WEST, S.A. LANGENECKER & G. PANDEY. Interplay between Pro-inflammatory Cytokines, Executive Function, and Childhood Trauma in Depressed Adolescents.
Objective: Pro-inflammatory cytokines have been linked to depression, impairment in executive function, and early childhood trauma and adversity in adults. Whether these links are present during adolescence, a time when vulnerability to depression is heightened, a critical period of brain development, and a point more proximal to childhood trauma, is not well understood.
Participants and Methods: Serum levels of interleukin (IL)-6, IL-1β, and tumor necrosis factor alpha (TNF-α) were measured in 70 un-medicated adolescents aged 12-17, including 40 with any DSM-IV depressive mood disorder (AMD), a sub-set (n = 22) of whom reported a history of childhood trauma (AMD-T), and 30 healthy controls (HCs). Participants completed performance-based (Parametric Go/No-Go Task) and observer-rated (Behavior Rating Inventory of Executive Function) measures of executive function. Procedures were conducted at a subspecialty clinic (Dec 2015 - June 2017).
Results: IL-6 was elevated in AMD and AMD-T adolescents compared to controls (p = .014) and TNF-α was elevated in AMD participants only (p = .040), whereas no group differences were found in IL-1β (p = .829). Additionally, AMD-T participants demonstrated relative deficits in performance-based (p = .044) and observer-rated inhibitory control (p = .049). TNF-α was associated with performance-based (r = -.25, p = .039) and observer-rated (r = .32, p = .009) inhibitory control deficits.
Conclusions: The current results suggest that inflammation may be a marker of disease processes in adolescent depression. These probes may contribute to identification of risk for depression and executive dysfunction early in the course of a highly recurrent illness.
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S. POCIUS, S.A. LANGENECKER, J. STANGE, K. KREUTZER, N. CRANE, L. KLING & S. DELDONNO. Decreasing Connectivity in the Cognitive Control Network Seen in Increasing Report of Non-Fatal Self-Injurious Behavior.
Objective: In this present study an expanded consideration of non-fatal self-injurious (NFSI) behaviors is examined in relation to neural imaging. These neurobiological differences between varying degrees of NFSI behaviors may lead to a better understanding of susceptibility to suicide risk which may lead to more proactive intervention to those more susceptible to suicide attempt.
Participants and Methods: 157 individuals between the ages of 18 and 29 were diagnosed through completion of the Diagnostic Interview for Genetic Studies (DIGS; Nurnberger et al., 1994). All participants underwent a cognitive battery followed by an fMRI scan with an eight-minute resting state component. Various questions from the DIGS were compiled to measure NFSI. Five total subscales were constructed: (1) Traditional Self-Harm (2) Traditional Impulsivity (3) Self-Detrimental (4) Decreased Empathy (5) Risky Behaviors. The Statistical Package for the Social Sciences (SPSS) was used for statistical analysis. A CCN model containing dorsolateral prefrontal cortex (dlPFC) and inferior parietal lobule (IPL) seeds and a CCN network mask were created. The CCN network mask was used with the CCN seed models to examine within- and between-network connectivity. Four separate models were conducted to examine connectivity within the CCN using SPM8.
Results: In each of the four models examining regions of connectivity associated with decreasing NFSI, regions in the bilateral dlPFC and IPL were identified. None of the CCN seeds were associated with increasing NFSI.
Conclusions: These results suggest that individuals with decreased display of NFSI behaviors may have specific patterns of connectivity within the CCN, of which plays an important role in higher-level functioning and complex problem-solving. The results also offer the potential of using rs-fMRI as an identifying tool for those who may be more susceptible to partaking in NFSI-like behaviors, as well as those who may be more at risk for suicide.
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K.C. SHEPARD, A.I. BURNS, M. OZCAN, A. ALKOZEI, J. VANUK & W. KILLGORE. Racial Differences Regarding the Effectiveness of Blue Light Therapy in Reducing PTSD Severity.
Objective: Daily blue light therapy (BLT) has been used as a treatment for certain mood and sleep disorders. It has not yet been investigated if BLT would also be effective for post-traumatic stress disorder (PTSD) and whether its effectiveness may differ across racial groups. Here, we examined potential differences in the effectiveness of BLT for reducing PTSD severity between majority and minority racial groups.
Participants and Methods: Forty-four men and women (52.2% female, Mean age=31.0, SD=8.45) with a clinical diagnosis of PTSD were randomized to 6 weeks of 30 minutes of morning BLT (n=23), or placebo amber light (n=21). Thirty participants identified as the culturally dominant racial group of White/Caucasian, while the remaining 14 participants identified as a minority racial group (Hispanic/Latino, African American/Black, Native American/American Indian, or Other). Pre- and post-light therapy, participants completed the Clinician-Administered PTSD Scale for DSM-5 as a measure of PTSD severity.
Results: A repeated-measures ANOVA showed a significant decrease in PTSD severity over time, regardless of race or light condition ($F(1,39)=61.58$, $p=.001$). However, there was a group x time x race interaction, such that BLT was found to be more effective at reducing PTSD severity for those in the racial majority than the minority group ($F(1,39)=5.14$, $p=.029$).
Conclusions: While daily light therapy was effective at reducing PTSD symptoms across racial groups, BLT was more effective at reducing PTSD severity for those who identified as White/Caucasian, while the amber light condition was more effective at reducing PTSD severity within the racial minority category. The results highlight that race is an important factor to consider when evaluating light therapy effectiveness, and that further analyses regarding the effect of amber light therapy as a treatment for PTSD should be examined.
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K.C. SHEPARD, M. OZCAN, A.I. BURNS, A. ALKOZEI, J. VANUK & W. KILLGORE. Differences in Anxiety Reduction between Minority and Majority Racial Groups Participating in Morning Blue Light Exposure.
Objective: Those who identify as White/Caucasian are more likely to be diagnosed with an anxiety disorder than those who identify as a minority racial group. Increased anxiety is a common symptom for those with post-traumatic stress disorder (PTSD). Blue light therapy (BLT) has been used as a treatment for depression and sleep disorders,

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however, the effect of BLT on anxiety levels for individuals with PTSD has yet to be investigated. We examined the effect of BLT on anxiety symptoms between minority and majority racial groups in a sample of individuals with PTSD.
Participants and Methods: Forty-four men and women (52.2% female, Mean age=31.0) with a clinical diagnosis of PTSD were randomized to 6 weeks of 30 minutes of morning BLT (n=22), or placebo amber light (n=22). Thirty of these participants identified as the culturally dominant racial group of White/Caucasian (68.1%, mean age= 31.6), while the remaining 14 participants identified as a minority racial group (Hispanic/Latino, African American/Black, Native American/American Indian, or Other). Pre- and post-light therapy, participants completed the Beck Anxiety Inventory (BAI) as a measure of anxiety symptoms.
Results: A repeated-measures ANOVA showed a significant main effect of time, such that all individuals decreased in their anxiety level ($F(1,39)=38.86$, $p=.001$), as well as a significant time x race interaction, such that that those in the minority racial group reported a significantly greater reduction in anxiety levels than those in the majority racial group ($F(1,39)=10.15$, $p=.003$).
Conclusions: After using either the blue light or amber light for a period of six weeks, both the minority and majority racial groups reported significant decreases in anxiety severity. However, racial minorities were found to have significantly larger reductions in anxiety symptoms, when compared to those in the majority racial group. Further research is needed to fully understand the increased effect the treatment has on anxiety levels within racial minorities.
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A. MASEY, A. STABLER, D. HARPER & R. PATRICK. Does Color Effect Processing Speed?: A Study of Stroop Performance Among Older Adults with Mood Disorders.
Objective: The Stroop Color and Word Test manual (Golden and Freshwater, 2002) states that "Occasionally, low Color scores are seen in psychiatric clients where the colors may arouse emotional rather than cognitive reactions" (p. 9). While not accompanied by any references, this statement is presumably grounded in the broader and somewhat obscure literature linking chromatic stimuli with affective valence. Review of the literature, however, reveals minimal direct support for slowed Color Naming vs Word Reading in affective disorders, with almost no studies examining this purported phenomenon in older adults. Therefore, the present study investigated whether older adults with mood disorders showed disproportionate difficulty on Color Naming vs Word Reading.
Participants and Methods: One-hundred and twenty four older adults were selected from a database of research participants at a large psychiatric hospital in the Boston area (35 controls, 24 Major Depressive Disorder, and 65 Bipolar Disorder). All participants completed the Stroop as part of a larger neuropsychological battery. We analyzed whether trait-based (diagnostic category) or state-level (MADRS) mood disturbance differentially affected Color Naming vs. Word Reading scores.
Results: A two-way repeated measures ANCOVA controlling for age and sex did not reveal a significant group (Control, Unipolar, Bipolar) by condition (Color Naming, Word Reading) interaction ($p=.56$). In addition, linear regression revealed that state-level depression (MADRS) was not predictive of a Word-Color discrepancy score among patients with mood disorders ($p=.173$).
Conclusions: The present investigation revealed that, at least among older adults with mood disorders, neither state- nor trait-level mood disturbance was predictive of disproportionate difficulty on Color Naming vs Word Reading. These findings are not supportive of the Stroop manual's claim that "colors may arouse emotional rather than cognitive reactions" among psychiatric patients.
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J. STUDENY, B. KAVANAUGH & K. HOLLER. The Latent Structure of the Wisconsin Card Sort (WCST) in a Sample of Psychiatrically Hospitalized Youth.
Objective: Existing literature on the WCST suggests that latent structure models vary between adult, pediatric, clinical, and nonclinical samples (Greves et al., 2005). This study examined the latent structure of the WCST in child patients with acute mental illness to further inform assessment and interpretation of the WCST in pediatric practice.
Participants and Methods: A medical chart review was conducted for 128 children aged 6-12 years who received a neuropsychological evaluation during psychiatric inpatient program hospitalization from 2010-2016. A principal components analysis of seven select indices of the WCST was conducted to determine the latent structure of the WCST. Latent factors were then analyzed for associations with demographic and psychiatric variables, as well as other neuropsychological and psychological test measures using partial correlation analysis.
Results: Results revealed a three-factor solution that accounted for 96% of the total variance with factors related to problem solving (Factor 1), cognitive flexibility (Factor 2), and interference control (Factor 3), based on respective factor loadings (see Table 3). Factor 1 was associated with CDI ($r=-.266$, $p<.05$), MASC ($r=-.331$, $p<.05$), and TSCC ($r=-.315$, $p<.05$) self-report measures, as well as FSIQ ($r=.444$, $p<.01$), verbal fluency (FAS, $r=.273$, $p<.01$; Animals, $r=.250$, $p<.01$), and Stroop Color-Words ($r=.223$, $p<.05$). Factor 2 was associated with the MASC ($r=-.275$, $p<.05$), FSIQ (.389, $p<.01$), verbal fluency (FAS, $r=.239$, $p<.01$; Animals, $r=.178$, $p<.05$), and RCFT-copy ($r=.182$, $p<.05$). Factor 3 was associated with the MASC ($r=-.205$, $p<.05$) and FSIQ ($r=.213$, $p<.05$).
Conclusions: Results confirm that the WCST is a multidimensional test of executive functioning when used in clinical child settings. These findings are specifically relevant for clinical child psychiatry, whereby the latent structure of the WCST and the respective associations to psychiatric and neuropsychological variables may be considered when evaluating children in similar clinical settings.
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E. SULLIVAN-BACA, C. NEUMANN & A. SURIS. Associations between Post-Trauma Psychological Symptoms and Neurocognitive Test Performance in a Mixed Veteran and Civilian Female Sample.
Objective: While a growing body of research supports the notion that increased psychological symptoms following trauma put an individual at risk for poorer neurocognitive function (Aupperle et al., 2011), the exact relationship between these variables requires further exploration. Women, including civilians and veterans, are an under-studied population within this field of inquiry and may evidence unique associations between trauma and neuropsychological outcomes (Stricker et al., 2015). The present study sought to examine how mood, anxiety, and PTSD symptoms predict attention and executive functioning in a mixed sample of women veterans and civilians exposed to traumatic situations.
Participants and Methods: Sixty participants (Age $M = 29.73$, $SD = 10.91$) completed the study: 33 from the University of North Texas and surrounding community and 27 from a large southwestern VA Medical Center. Psychological measures included the Beck Depression Inventory, Second Edition (BDI-2), Beck Anxiety Inventory (BAI), PTSD Checklist for DSM 5 (PCL-5), and Clinician-Administered PTSD Scale for DSM-5 (CAPS-5). Neuropsychological testing consisted of the Wechsler Test of Adult Reading (WTAR), DKEFS Color-Word Interference Task, and Iowa Gambling Task (IGT).

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Results: WTAR score predicted performance across DKEFS and IGT tasks. Anxiety symptoms (BAI) added additional predictive value to IGT Net 5 score (R^2 = .22, p < .01; b = -.39). In those with moderate to severe psychological symptoms, BDI-2 score best predicted DKEFS Color Naming (R^2 = .23, p < .01; b = -.39) and Color-Word Interference (R^2 = .19, p < .05; b = -.33), with CAPS-5 severity predicting DKEFS Interference/Switching (R^2 = .07, p < .05; b = -.31).
Conclusions: Results suggest a combination of premorbid intelligence, anxiety and depression symptoms, and PTSD symptoms may predict neurocognitive functioning after trauma in women. Specifically, anxiety and PTSD symptoms may be closely related to executive function outcomes, while depression may affect attention and processing speed.
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S.M. SZYMKOWICZ & R. VANDERPLOEG. Neuropsychological Correlates of Depressive Symptoms and Symptom Clusters in Young to Middle-Aged Men.
Objective: Depression is a heterogeneous disorder with affective, cognitive, and somatic symptoms. Evidence suggests different symptom clusters are related to specific aspects of cognitive function, especially in older adults. The current study extends existing literature by examining depressive symptom clusters and cognitive functioning in a sample of young-to-middle aged adults.
Participants and Methods: A sample of 2,671 men (mean age = 38.18 ± 2.44 years) was drawn from a study on Vietnam veterans. Participants had a valid MMPI and completed neuropsychological measures. Bootstrapped hierarchical regression models investigated relationships between cognitive performance and (i) MMPI Depression (D) scale scores and (ii) Harris-Lingoes depression symptom subscales (Affective: subjective depression; Cognitive: mental dullness, brooding; Somatic: psychomotor retardation, physical malfunctioning), adjusting for demographics, medical factors, and premorbid cognitive ability. Follow-up analyses investigated predictive value of specific subscales on cognitive performance, as well as the effect sizes of MMPI D scores on cognition.
Results: Higher MMPI D scores were related to worse attentional control (verbal memory encoding, set-shifting, set loss) and visual memory. Affective, cognitive, and somatic symptoms were negatively associated with different aspects of attentional control. After controlling for the influence of other symptom subscales, unique associations were found between cognitive symptoms and worse attentional control, as well as between somatic symptoms and poorer letter fluency. In terms of clinical significance, effect sizes were small (i.e., Cohen's *d's* of 0.00 – 0.28).
Conclusions: Findings highlight the heterogeneous nature of depression and the importance of examining both total depressive symptoms and symptom clusters to better understand their relationship with cognition across the lifespan.
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B. TANG & S.N. LIGHT. Distinguishing Apathy and Anhedonia with Neuropsychological Testing.
Objective: Anhedonia (a reduced ability to experience pleasure) and apathy (a lack of interest in or reduced motivation in activities, cognitions, and emotions) are difficult to disentangle clinically but have different neural correlates.
Participants and Methods: Two patients with an active mood disorder were assessed with a standardized neuropsychological test battery that included a novel behavioral task designed to quantify anhedonia with greater ecological validity. During the task, each individual looked at a series of human faces evincing neutral or varying degrees of positive emotion and then indicated the presence/absence of positive emotion via speeded key press. The results from this task, along with standard neuropsychological test data, are presented to illustrate how these constructs can be differentiated in the clinic.
Results: Self-reported apathy related to normal performance on the Happy Faces Task, whereas self-reported anhedonia was associated with selective impairment on "low"- versus "high"-intensity face trials. Furthermore, these individuals had distinguishable neuropsychological profiles in other ways. Specifically, they had separable memory difficulties; and the individual with anhedonia evidenced loss in abstraction ability whereas the individual with apathy had specific difficulties with planning. The individual with apathy demonstrated intact sustained attention whereas the individual with anhedonia did not.
Conclusions: The individual with prominent apathy had a history of concussion, migraine, and mixed anxiety/depression. In contrast, the individual with prominent anhedonia had a history of substance abuse, sleep apnea, and chronic Major Depressive Disorder treated with electroconvulsive therapy (ECT). These results highlight the importance of taking a detailed history and testing current affective responsiveness to correctly distinguish apathy from anhedonia and make differential recommendations.
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K.S. TANEV, L.E. FEDERICO, D.P. TERRY, E.L. CLARK & G.L. IVERSON. Cognitive Impairment Does Not Predict Response to Treatment in an Intensive Clinical Program for Post-9/11 Veterans with Posttraumatic Stress Disorder.
Objective: This study examined whether objectively measured pre-treatment cognitive impairment predicted worse response to treatment in a new, multidisciplinary two-week intensive clinical program for post-9/11 veterans with posttraumatic stress disorder (PTSD).
Participants and Methods: Participants were 113 post-9/11 veterans and active duty service members who participated in individual trauma-focused cognitive-behavioral therapy, group psychotherapy, psychoeducation and skills-building groups, and complementary and alternative medicine treatments as part of a two-week intensive clinical program (age: *M*=39.7, *SD*=8.5; 20% women). Before treatment, participants completed a brief computerized cognitive battery (CNS Vital Signs) and were operationalized as having cognitive impairment if they scored ≤5th percentile on two of five core cognitive domains. Participants completed measures of traumatic stress, depression, cognitive self-efficacy, and satisfaction with their ability to participate in social roles before and after treatment.
Results: Half of the sample (49.6%) met criteria for cognitive impairment. In a mixed MANOVA, the interaction between cognitive impairment and time was not significant [F(4, 108)=0.83, p=0.51)], indicating that the changes in scores across time were not significantly different based on cognitive impairment group membership. The multivariate main effect for time was significant [F(4, 108)=36.75, p<0.001]. Follow-up univariate tests revealed significant improvement in traumatic stress, depression, cognitive self-efficacy, and satisfaction with social roles after treatment. Results did not change in models that covaried for gender, education, and relationship status.
Conclusions: Cognitive impairment was not associated with worse response to treatment in veterans with severe and complex mental health problems. Veterans with and without cognitive impairment reported large improvements in symptoms and functioning after intensive clinical treatment.
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J.J. ZAKRZEWSKI, R. MACKIN, C. CHOU, S. UHM, L. BAIN, S. STARK, M. GAUSE, O. VIGIL, J. FRANKLIN, M. SALAZAR, E. VEGA, J. CHAN, M. ECKFIELD, J. TSOH, K. DELUCCHI & C.A. MATHEWS. Perception vs. Reality: Attention and Memory in Hoarding Disorder.

Objective: Individuals with Hoarding Disorder (HD) frequently complain of problems with attention and memory. These self-identified difficulties are often used as justification for saving and acquiring behaviors. Research using neuropsychological measures to examine verbal and visual memory performance as well as sustained attention and visual detection, while limited, have reported contradictory findings. In this study, we aim to determine the relationship between self-reported problems with memory and attention, actual memory and attention performance, and how task performance is related to levels of psychopathology in a treatment-seeking sample of individuals with HD.

Participants and Methods: Neuropsychological and clinical data on 252 individuals without significant neurological confounders were extracted from the parent study of 313 HD participants. Multiple regression was used to assess prediction of task performance based on self-report measures with age, education, HD severity and measures of depression and anxiety as covariates.

Results: Participants were older (60±10.4) and majority female (77%). Self-reported memory difficulties were not related to either verbal or visual memory performance. Self-reported problems with attention were also unrelated to visual detection and sustained attention performance. When accounting for levels of psychopathology, HD severity predicted verbal memory performance ($p<.04$), anxiety predicted visual memory performance ($p<.04$), and HD severity, anxiety and depression, all predicted sustained attention ($p<.05$).

Conclusions: Self-reported difficulties with memory and attention in individuals with HD were unrelated to actual performance. These results demonstrate a dissociation between perception and reality of abilities in memory and attention in HD. However, levels of psychopathology did predict aspects of memory and attention performances highlighting the importance of obtaining objective measures and psychopathology focused treatment for individuals with HD.

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Neuropsychiatry/Psychopharmacology

M. BASSO, D. GUZMAN, J. HOFFMEISTER, D. WHITESIDE & D. COMBS. Performance and Symptom Validity in Inpatient Depressives.

Objective: Bigler (2014) asserted that performance validity test (PVT) failures reflect fatigue, pain, and depression rather than poor effort. In contrast, Green et al. (2001) asserted that PVT failure in depressed individuals reflects poor effort, and forgetfulness in such patients reflects poor effort rather than genuine impairment. This study empirically evaluated these assertions in non-compensation-seeking depressed inpatients.

Participants and Methods: Participants included 48 depressed inpatients admitted to a psychiatric ward. They underwent a battery that included the California Verbal Learning Test-II and the Minnesota Multiphasic Personality Inventory-2-RF. Performance validity was assessed with the Word Memory Test (WMT).

Results: WMT scores were used to determine performance validity according to criteria in the test manual. Of the 48 patients, 38% (n=18) failed the WMT, implying poor effort. Regarding CVLT-II impairment, 54% (n=26) of the sample achieved T-scores lower than 40. Of these, 53% (n=14) failed the WMT, whereas 47% (n=12) had impaired memory but exerted normal effort on the WMT. Using a $p<.01$ criterion, correlations revealed that MMPI-2-RF scales pertaining to depression and anxiety were significantly related to WMT performance (r's=-.3). However, MMPI-2-RF validity scales pertaining to exaggerated symptoms (F, Fp) achieved significance (r's=-.3 to -.4).

Conclusions: Authentic memory impairment occurred in approximately 25% of the inpatient depressives. Clinicians should recognize the risk of such impairment, and address it in treatment plans to mitigate morbidity for patients. Such impairment notwithstanding, more than half of patients who manifest poor memory performance exert invalid test effort. Poor effort correlated with depressed and anxious mood and exaggerated symptom severity. Thus, as depressed patients exaggerate symptoms, they are prone to exert poor effort on neuropsychological testing.

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E. ESTEVIS, M. BASSO & R. PURDIE. Impulsivity and Executive Function Impairments in Depressed Inpatients.

Objective: Depression is a common neuropsychiatric condition that negatively impacts different facets of patients' functioning. This includes problems with impulsivity and executive function abilities. Consequently, these problems can lead to significant consequences in this population such as suicidal ideation, addictive behaviors, poor decision-making, and decreased quality of life. Studies involving impulsivity and depression are limited and studies examining executive functioning have been inconsistent. Moreover, most studies have not included measures of performance validity. The current study examined impulsivity and executive functioning in a group of depressed inpatients and healthy-controls.

Participants and Methods: 20 depressed inpatients and 20 healthy-controls were administered a structured diagnostic interview; CMDI; Barratt Impulsiveness Scale; Iowa Gambling Task; D-KEFS: Verbal Fluency, Color-Word Interference Test, Design Fluency Test; WCST; Verbal Concept Attainment Test (VCAT); Trail Making Test Part B; Word Memory Test; WAIS-IV Reliable Digit Span; and CVLT-2 Forced Choice.

Results: Performance validity testing was within normal limits. One-way ANOVAs were utilized to examine performance on all measures between the groups. Results showed that the two groups significantly differed on the Barratt Impulsiveness Scale Total Score and most other subscales; D-KEFS: Verbal Fluency Tests, Design Fluency Total Score, and Color Word Interference Inhibition and Inhibition/Switching Tests; VCAT; and Trail Making Test Part B.

Conclusions: Depressed inpatients exhibited clinically elevated symptoms of impulsivity and impairments on aspects of executive function. This suggests that this population may be at risk for engaging in maladaptive behaviors that may have detrimental consequences. Providers are recommended to be alerted to patients with similar neurocognitive profiles, as they may require more intensive treatments. These findings may serve to assist providers who work with this population.

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J.N. IKANGA, R.F. BREIMAN, F.B. NAHAB & A.Y. STRINGER. Prediction of the Performance on the African Neuropsychological Battery in Congolese with History of Psychiatric Disorder.

Objective: While psychiatric disorder may be associated with cognitive deficit, the relationship can be moderated by demographic variables (DV). We examined the relationship of DV to cognitive test performance on the African Neuropsychological Battery (ANB), a culturally and linguistically appropriate measure of cognitive function for Sub-Saharan African populations, hypothesizing that DV would predict cognitive performance in Congolese with a history of psychiatric disorder.

Participants and Methods: Subjects were 88 volunteers [male/female 45/43, mean age=47.9 years (SD=19.06), mean education=11.6 years (SD=4.1)] with a history of single (12) or multiple (76) psychiatric diagnoses. Tests were administered one-on-one, by trained technicians. After

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characterizing the pattern of ANB performance using analysis of variance and t-tests, stepwise hierarchical multiple regression analyses (HMR) were used to test the hypothesized relationships between DV (order of entry: age, education, gender, and locale) and ANB performance.
Results: ANB performance significantly declined with increasing age and improved with increasing education. Males performed significantly better than females and urban tended to perform better than rural dwellers. However, in HMR, age and education combined accounted for 28-52% of variance across ANB tests. The addition of gender only significantly increased prediction of associative visuospatial learning, and locale did not account for significant additional variance in ANB tests.
Conclusions: Age and education were strong linear predictors of ANB performance, while neither gender nor locale accounted for significant variance. Gender predicted cognitive performance in a prior study in healthy Congolese, but did not significantly increase predictive power in the current study. Results provide partial confirmation of study hypotheses, but reinforce the importance of taking age and education into consideration in norm development in Africa.
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J.N. IKANGA, R.F. BREIMAN, F.B. NAHAB & A.Y. STRINGER. Lack of Association between Past Psychiatric History and Current Performance on the African Neuropsychological Battery.
Objective: There is a high incidence of psychiatric disorder in African countries with high rates of poverty and civil conflict. This poses a potential confound when attempting to detect cognitive impairment in neurological conditions. The African Neuropsychological Battery (ANB) is a culturally and linguistically appropriate measure of perception, memory, language, and executive ability for Sub-Saharan African populations. While age and education have been shown to affect performance on this battery, this is the first study to examiner whether a history of psychiatric disorder impacts ANB performance.
Participants and Methods: Subjects were 192 Congolese volunteers, of which 104 were healthy volunteers [male/female 49/55, mean age=46.7 years (SD=16.5), mean education=12.5 years (SD=4.1)] and 88 volunteers with a psychiatric history [male/female 45/43, mean age=47.9 years (SD=19.06), mean education=11.6 years (SD=4.1)]. Tests were administered one-on-one, by trained technicians who evaluated either in French (68), or French and Lingala (80), or partially in both languages (44). One-Way Analyses of Covariance (ANCOVA) were conducted to find out whether there is a significant difference in cognitive performance on ANB tests between healthy and those with psychiatric history while adjusting for age and education.
Results: After controlling for age and education, healthy and psychiatric subjects differed significantly only in visuospatial memory, but this difference was not significant after application of Bonferonni correction
Conclusions: Patients with a past history of psychiatric disorder, but no acute or ongoing condition, perform comparable to controls on the ANB. Given the high incidence of psychiatric disorder in Congo, the insensitivity to past psychiatric disorder will be helpful in eliminating this potential confound in interpretation of the battery with neurological patients.
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J.B. SCHAFFER & B.B. RABINOVITZ. Does General Intellectual Functioning (as Assessed via Word Reading) Predict Performance on Verbal and Non-Verbal Memory in an Inpatient Psychiatric Sample?
Objective: Estimating premorbid function via word reading is common in neuropsychological assessment. Research in non-clinical populations demonstrates that these estimates predict overall intellectual functioning and performance in specific neuropsychological domains. Comparisons of current performance to premorbid estimates should be considered when evaluating change in cognitive functions. Understanding these estimates in relation to an inpatient psychiatric population can help refine our interpretation of these comparisons.
Participants and Methods: Standard scores on word reading (Test of Premorbid Functioning or Wechsler Test of Adult Reading), verbal memory (California Verbal Learning Test - II), and non-verbal memory measures (Brief Visuospatial Memory Test – Revised) from 34 adults assessed on a psychiatric inpatient unit were analyzed using Pearson correlations and simple linear regression analyses. Stepwise linear regression evaluated the contribution of attention to the relationship between premorbid functioning and non-verbal memory.
Results: Pearson correlations and simple linear regression analyses demonstrated that word reading significantly predicted CVLT-II performance, including total recall over trials 1-5 ($r=0.382$, $p=0.023$; $R^2=0.146$, $p=0.045$), short delayed recall ($r=0.423$, $p=0.012$; $R^2=0.179$, $p=0.025$), and long delayed recall ($r=0.443$, $p=0.009$; $R^2=0.197$, $p=0.018$), and BVMT-R performance, including trial 2 recall ($r=0.750$, $p=0.002$, $R^2=0.563$, $p=0.003$), trial 3 recall ($r=0.757$, $p=0.001$, $R^2=0.573$, $p=0.003$), and delayed recall ($r=0.729$, $p=0.002$, $R^2=0.532$, $p=0.005$). Attention did not predict memory performance above premorbid function.
Conclusions: These findings suggest that premorbid intellectual functioning predicts verbal and non-verbal memory performance in psychiatric inpatients and should be considered when interpreting performance. Future research should examine how other factors unique to psychiatric inpatients may moderate these findings.
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E. STOLZ, M.C. STEVENS, D.A. FEIN, R.P. SO, F. STEFFEN-ALLEN, T.I. MICHAELS, M. LY, X. YANG, E. PETERS, G.D. PEARLSON & C.M. CHEN. Markers of Cortical Excitability in Schizophrenia: A TMS-EEG Study.
Objective: Better understanding the neurophysiology of auditory hallucinations is of particular interest because they occur in the majority of patients with schizophrenia (60-80%) and are reported to significantly decrease quality of life. The present study aimed to investigate the range of cortical excitability in speech production regions in a schizophrenia population with auditory hallucinations.
Participants and Methods: A combined transcranial magnetic stimulation (TMS) and electroencephalography (EEG) paradigm was utilized to examine whether the range of cortical excitability in the gamma band (Broca's area, electrode F7) differs in a schizophrenia population (n=7) as compared to a control group without a history of psychiatric or neurological illness (n=7). Cortical excitability was defined as the percent signal change between Broca's stimulation and sham conditions. Differences between EEG gamma power during TMS stimulation and during sham condition were also examined across groups.
Results: There was a non-significant but trend level difference in TMS induced gamma power as compared to sham condition across all participants ($t(13)=1.86$, $p=0.08$). However, there were no significant differences ($t(12)= - 0.13$, $p=0.89$) in cortical excitability between groups.
Conclusions: TMS induced a trend-level difference in gamma power in speech production regions across participants but no differences in cortical excitability were found between individuals with schizophrenia and controls. As prior studies have demonstrated measures of cortical excitability differentiate treatment responders from non-responders in other psychiatric populations, it is possible that variation in cortical excitability may provide meaningful information about differences between individuals with schizophrenia. Future work should incorporate cognitive and other behavioral measures to determine whether cortical excitability is associated with more established estimates of functioning in individuals with schizophrenia.
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Other

X. CALDÚ, M. GAROLERA, J. OTTINO-GONZÁLEZ, X. PRATS SOTERAS, M. SÁNCHEZ-GARRE, I. HERNAN, E. TOR, M. SENDER-PALACIOS & M. JURADO. Binge Eating Symptoms Associate with Lower Affective Theory of Mind Performance in Obesity.

Objective: Theory of mind is a key aspect of social cognition that allows inferring mental states, feelings, motivations and beliefs of others and use this information to predict their future behaviour. Obesity is often accompanied with psychosocial adjustment problems, such as difficulties in social interactions and social withdrawal. Moreover, obesity concomitant with binge eating has been related to reduced theory of mind ability in the first-person domain, but its effect on theory of mind in the third-person domain is elusive. In the present exploratory study, we aimed at determining whether obesity and binge eating symptoms exert an impact on affective theory of mind performance.

Participants and Methods: Performance in the Read the Mind in the Eyes Test (RME) was obtained for 67 individuals with obesity (mean age = 31.5 years, SD = 7.96, age range = 18-48) and 62 normal-weight individuals (mean age = 28.9 years, SD = 7.34, age range = 18-42), as well as the scores in the Bulimic Investigatory Test, Edinburgh (BITE).

Results: Obese subjects obtained lower scores in the RME as compared to normal-weight individuals ($T = 2{,}18$, $p < 0.031$). When obese subjects were classified into those presenting binge eating symptoms (BITE symptoms scale > 9) and those who did not, a main effect of group was observed ($F = 5.167$, $p < 0.007$). *Post hoc* analyses with the Scheffe's test revealed a significant difference between subjects with obesity and binge eating symptoms compared to normal-weight subjects ($p < 0.007$), with subjects with obesity and binge eating symptoms showing lower scores than normal weight individuals. Differences in performance between obese individuals with and without binge eating symptoms were observed at a trend level ($p < 0.066$), again subjects with obesity and binge eating symptoms showing lower scores.

Conclusions: Our results indicate that the presence of binge eating symptoms in obesity is associated to lower theory of mind performance.

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Schizophrenia/Psychosis

H. AMSBAUGH & S.K. HILL. Clustering and Switching Impaired During Semantic but Not Letter Fluency in Psychotic Disorders.

Objective: The present study was designed to investigate set-shifting in psychosis by assessing clustering and switching in Letter and Semantic Fluency subtests from the Brief Assessment of Cognition in Schizophrenia (BACS). This approach was used to isolate set-shifting from other higher order processes assessed in broader measures of executive function. The relationship between set-shifting and problem solving (BACS; Tower of London) was also examined.

Participants and Methods: Thirty-seven patients with a SCID diagnosis of schizophrenia, schizoaffective, or affective disorder with psychotic features, and 30 demographically similar healthy controls were included. Separate MANCOVA were conducted to compare groups regarding clustering and switching during Letter and Semantic Fluency with total correct as a covariate.

Results: Against a backdrop of comparable performance on Tower of London and clustering/switching during Letter Fluency, robust group differences were observed in Semantic Fluency. Specifically, significant group differences were revealed for semantic switching [$F(1,65)=39.052$; $P<.001$] and average cluster size [$F(1,65)=4.955$; $P=.010$]. Regarding Letter Fluency, significant differences were only evident in letter F switching [$F(1,65)=125.116$; $P<.001$], while the remaining indices of clustering and switching in letter F and S fluency did not distinguish groups. Correlational analysis indicated that Tower of London shared very little variance with either Letter or Semantic Fluency.

Conclusions: Overall, patients with a psychotic disorder demonstrated impaired ability to organize search and selection procedures when not guided by phonological or grammatical associations. This pattern suggests a specific set-shifting deficit that becomes apparent when top-down processing demands are increased. The present findings highlight the need for specific measures of executive function to better elucidate the nature of executive dysfunction in psychosis.

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K. ANGERS, J. SUHR, M. BUELOW & M. RUNYON. An Investigation of Executive Function and Semantic Ability in a Non-Clinical Schizotypy Sample.

Objective: Schizotypy, like schizophrenia, is associated with impairments in executive function (EF) and semantic ability, although results are mixed. It is less clear whether these deficits are more associated with positive, negative, or disorganized symptoms. The aim of the current study was to examine whether specific symptoms (cognitive-perceptual/positive [CP], interpersonal/negative [IP], or disorganized [DO]) were related to poorer performance on EF and semantic tests.

Participants and Methods: Participants were 255 undergraduate students (61.7% female, 78.6% white, ages 18-24) who participated in a larger study about schizotypal personality symptomatology. As a part of the larger study, participants completed the Schizotypal Personality Questionnaire-Brief Revised (SPQ), several measures of semantic fluency (animals, fruits, vegetables, furniture, tools, and action words), the Wisconsin Card Sort Test (WCST), and the Sorting Test from the Delis Kaplan Executive Functioning System (DKEFS). The relationship of the 3 SPQ factors (CP, DO, and IP) to average Z score across all measures of semantic fluency, WCST perseverative errors, and number of correct sorts, description score, and sort recognition description score across the 2 conditions of the Sorting Test, after controlling for scores on the Test of Premorbid Functioning (to estimate premorbid verbal intellect) was examined.

Results: Higher CP symptoms were significantly related to higher semantic fluency scores but more WCST perseverative errors and worse DKEFS sort recognition. Higher DO symptoms were significantly related to higher semantic fluency scores only. Higher IP symptoms were related to worse performance on DKEFS (trend for number of correct sorts, worse description score).

Conclusions: Results suggest both CP and IP symptoms are associated with impaired concept formation. Given the intriguing findings regarding semantic fluency, further analysis of the nature of the performance (semantic relatedness, atypical or unusual responses) should be conducted.

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H. BERTISCH, M. LUSTBERG, T. COATS, B. FROEHLICH, K. CIMINO & M. LAZAR. Deciphering Associations Between Psychosis and Cognition in Psychotic-Spectrum Disorders.

Objective: Schizophrenia is a complex multifaceted brain disorder which comprises a combination of psychiatric and cognitive symptoms. It is often difficult to clinically distinguish between schizophrenia, schizoaffective disorder, and bipolar disorder with psychotic features, especially among young early-episode patients. Within the context of interdisciplinary investigations, neuropsychologists can help to characterize the associations between the psychotic and cognitive symptoms within each of these disorders, which can improve our diagnostic precision and provide clues about underlying brain pathology. The objective of the present study is to clarify the patterns of relationships between psychotic and cognitive symptoms in patients with primary psychotic disorders versus bipolar disorder with psychotic features.

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Participants and Methods: As part of a parent study on neuroimaging and early stage psychosis, twenty-six young individuals with schizophrenia or schizoaffective disorder and twelve with bipolar disorder with psychotic features completed the Diagnostic Interview for Genetic Studies and the MATRICS Consensus Cognitive Battery.
Results: Distributions and correlations within each diagnostic group are reported. Although the diagnostic groups appear outwardly similar in terms of psychotic symptoms ($p > .05$ on the Scales for the Assessment of Positive and Negative Symptoms), they demonstrate distinct patterns of relationships between psychotic and cognitive symptoms ($p < .05$).
Conclusions: Knowledge of these preliminary associations between psychosis and cognitive symptoms within primary psychotic disorders versus bipolar disorder with psychotic features has the potential to improve our diagnostic accuracy and can offer information about distinct mechanisms that underlie each of these disorders. Implications of neuroimaging findings are also discussed.
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N. BOLDEN, T. ANDERSON, K. MCFARLANE, S. BOWYER, K. RUSINIAK & R. LAJINESS-O'NEILL. Using MEG to Inspect Visual Sensory Gating in Schizophrenia.
Objective: Impaired auditory sensory gating has been found in schizophrenia and is suggested to be related to clinical symptoms (e.g. hallucinations, delusions, avolition). However, little is known about visual sensory processing and the effects of clinical symptoms on the gating response in schizophrenia. Moreover, the use of magnetoencephalography (MEG) to assess sensory gating is limited. The present study examined differences in the M50 visual sensory response in schizophrenia as well as its relationship with symptom severity.
Participants and Methods: A visual paired-flash paradigm was used to examine visually evoked MEG responses in 18 adults with schizophrenia (9 with predominant negative symptoms, 9 with positive symptoms), and 9 healthy matched controls ($M(SD)_{Age} = 41.7(10.6)$). Participants were administered The Structured Clinical Interview for DSM-TR, and The Positive and Negative Syndrome Scale. Response latency, amplitude, and gating ratio of the M50 were investigated as well as their correlation with clinical symptoms.
Results: Neither latency, amplitude, nor gating ratio statistically differed between schizophrenia and matched controls. Moreover, there were no statistical differences in these visual sensory responses between positive and negative symptoms. However, between the schizophrenia subgroups, S1 latency accounted for a large effect size difference, Cohen's $d = .96$. Additionally, higher negative symptoms correlated with longer S1 response latency ($r = .50$, $p = .04$), higher S2 amplitudes ($r = .55$, $p = .02$), and higher S2/S1 gating ratios, $r = .54$, $p = .03$.
Conclusions: Although statistically significant between group differences in the M50 visual sensory response was not found, there was a large effect size for S1 latency between clinical symptoms–suggesting less efficient fundamental visual sensory processing in schizophrenia. Significant relationship between visual sensory processing in individuals with schizophrenia and clinical symptoms was also noted, particularly in those with negative symptoms.
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C.Z. BURTON & I. TSO. Neuropsychological and Social Cognitive Predictors of Cognitive Insight among Individuals with Schizophrenia and Bipolar Disorder.
Objective: Cognitive insight is an aspect of metacognition that involves the capacity for self-reflection to re-evaluate and correct misinterpretations. This ability is reduced by overconfidence in conclusions, and is hypothesized to contribute to the persistence of delusional beliefs among individuals with psychosis. The neuropsychological and social cognitive correlates of cognitive insight, however, are understudied. This study examined neuropsychological and social cognitive predictors of cognitive insight among individuals with schizophrenia and bipolar disorder.
Participants and Methods: Participants included 44 individuals in a study of eye gaze processing abnormalities among those with severe mental illness. Participants completed the MATRICS Consensus Cognitive Battery (MCCB), the Positive and Negative Syndrome Scale, and the Beck Cognitive Insight Scale (BCIS). The BCIS is a 15-item self-report questionnaire that assesses self-reflectiveness and self-certainty; a composite index score is calculated by subtracting the self-certainty total from the self-reflectiveness total, and higher scores indicate better cognitive insight. Simultaneous regression included age-corrected t-scores from the 10 MCCB subtests as predictors of the BCIS index score; demographic (age, education, gender, reading score) and clinical (positive and negative symptoms) predictors were then entered in two additional steps.
Results: The first model (including only MCCB predictors) was not significant, but accounted for 33% of the variance in BCIS index score. Only social cognition (MSCEIT) significantly predicted cognitive insight ($\beta=0.17$; $t=2.87$; $p=0.007$). Social cognition remained the only significant predictor when demographic and symptom variables were added; these models were not significant and each explained only 3% of additional variance.
Conclusions: These results suggest that social cognitive ability may play a key role in capacity for cognitive insight, beyond other neuropsychological abilities and demographic or clinical features.
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B. CASSETTA, L. TOMFOHR-MADSEN & V. GOGHARI. A Randomized Controlled Trial of Domain-Targeted Cognitive Training in Schizophrenia.
Objective: Individuals with schizophrenia are commonly found to experience cognitive deficits in a number of different domains. Cognitive training has been studied as a method to remediate cognitive deficits, though little research has examined which domains should be targeted to generate the most widespread benefits for patients. It may be the case that targeting lower-level cognitive processes that are important for more complex aspects of cognition is an efficient way to improve functioning. Thus, the current study aimed to investigate the near-transfer (transfer of gains to related contexts) and far-transfer (transfer of gains to unrelated contexts) effects associated with working memory (WM) and processing speed (PS) training among individuals with schizophrenia.
Participants and Methods: Participants with schizophrenia or schizoaffective disorder (N = 83) were randomly assigned to 10 weeks of computerized WM training, PS training, or a no-training control group. Neurocognitive, social cognitive, and daily functioning measures were administered pre- and post-training. Primary outcome measures included WM, PS, and fluid intelligence.
Results: PS training led to significant improvements on untrained PS tasks as well as more complex far-transfer tasks that required speed. WM training did not lead to gains in untrained WM tasks and led to inconsistent effects on far-transfer tasks.
Conclusions: Domain-specific PS training can be beneficial for individuals with schizophrenia who have concerns about their speed, though transfer of gains to other cognitive domains or to daily functioning may not occur after targeted WM or PS training. However, non-specific effects (e.g., through behavioural activation) may lead to improvements on some tasks. Future studies should investigate the mechanisms by which training may lead to cognitive and functional gains for patients.
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D. COBIA, M. SMITH, C. RICH, J. CSERNANSKY & L. WANG. Basal ganglia shape features differentiate schizoaffective disorder from schizophrenia.

Objective: There is growing evidence that schizophrenia (SCZ) and schizoaffective disorder (SA) represent closely related syndromes that vary in severity along a neurobiological continuum. In the present study, we compared surface shape of basal ganglia structures in SCZ and SA relative to healthy controls (CON) and hypothesized that neuroanatomical differences would separate each patient group, with unique relationships to behavior.

Participants and Methods: T1-weighted magnetic resonance images were obtained from SCZ (n=47), SA (n=15), and CON (n=42) subjects who were matched for age, gender, parental socioeconomic status, and race. The caudate (CD), putamen (PU), and globus pallidus (GP) were characterized using high-dimensional brain mapping. Cognition and clinical symptoms were assessed through a comprehensive battery. MANOVA models tested group differences in brain shape, Pearson and regression models evaluated relationships with behavioral measures.

Results: Surface map comparisons revealed significant differences between SA and SCZ in the CD (λ=0.57, p=0.001), PU (λ=0.36, p<0.001), and GP (λ=0.47, p<0.001). Shape abnormalities in SA differed from, and were more severe, relative to SCZ. Significant correlations were noted between mental flexibility (TRAILS B) and bilateral shape of all structures (r = -0.25 to -0.47, p = 0.055to < 0.001). Significant correlations were also observed with negative symptoms (r= 0.26 to 0.34, p = 0.046 to 0.007). Follow-up regression models revealed basal ganglia shape significantly predicted mental flexibility performance ($F_{(6,55)}$= 3.72, p = 0.004, R^2= 0.288), but not negative symptom severity.

Conclusions: Unique patterns of basal ganglia shape emerged between the psychosis groups, each with differing relationships to behavior. To the extent that these differences reflect biological heterogeneity, the findings may prove useful in improving diagnostic precision, predicting risks associated with specific psychiatric disorders, and guiding the development of more individualized treatment.

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A.J. D. CROW, R.C. GUR, P.J. MOBERG, R.E. GUR & D. ROALF. Intra-Individual Variability in Psychosis Spectrum Disorders.

Objective: Previous studies have failed to illustrate consistent cognitive decline prior to the onset of psychosis or the years proceeding illness incipience (Bora & Murray, 2014). This may be due to a reliance on mean performance indices which may obfuscate subtle impairments, particularly those impairments that progress over time, that can instead be evaluated by calculating within-person fluctuations in performance using intra-individual variability (IIV; MacDonald, Nyberg, & Bäckman, 2006). Thus, we hypothesized individuals on the psychosis spectrum will have worse cognitive performance as measured by accuracy, speed, and reaction time IIV. Secondly, we expected IIV would be associated with current psychosis-related symptomology.

Participants and Methods: In the present study, individuals performed a novel neurobehavioral battery (Variability Toolbox) to estimate accuracy, speed, and IIV. Patients included DSM-IV psychotic disorder or at clinical high risk for psychosis (PS; n = 35; 54% male) with mean age 22 years (range 15-27 years) of primarily African-American decent (74%) and were compared to age-, sex-, and race-matched healthy controls (NC; n = 29).

Results: ANOVAs controlling for age, sex, and maternal education level indicated PS differed from NC with regard to accuracy (F(1,53) = 13.44, p < .001, η^2 = .16), speed (F(1,53) = 5.93, p = .018, η^2 = .06), and IIV (F(1,33) = 10.59, p = .002, η^2 = .21). IIV was not correlated with subthreshold psychosis symptoms, cognitive complaints, or global assessment of functioning after correcting for multiple comparisons.

Conclusions: These results replicate previous work with a novel test battery and further demonstrate IIV differentiates individuals with psychosis spectrum disorders from healthy individuals. Contrary to previous findings, IIV was not associated with current symptomology. These findings may support the notion cognitive dysfunction distinguishes but does not consistently predict psychosis-related psychopathology.

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K. DWYER, T. MIKHAEL, J.L. HOLDEN, P.C. LINK, J. SWENDSEN & E.L. GRANHOLM. Concordance of Self-Report and Ecological Momentary Assessments of Functioning in Schizophrenia: Moderating Effects of Attention and Executive Function.

Objective: A common aim in schizophrenia treatment research is to improve functional outcomes; therefore, it is crucial to use assessments of functioning that are ecologically valid. Functioning is typically assessed through self-report in which participants must recall their daily activities over the prior week to month. Given that schizophrenia is associated with cognitive impairment, participants' report of functioning during a laboratory assessment may not fully capture their real-world functioning. Ecological momentary assessment (EMA) may provide a more valid measure of functioning in individuals, particularly those with cognitive impairment. The current study examined whether specific cognitive domains moderate the relation between laboratory and EMA assessments of functioning.

Participants and Methods: Participants with schizophrenia or schizoaffective disorder (N=100) responded to questionnaires on smartphones about environmental context and frequency of productive behaviors. During a laboratory visit, they completed the self-report Independent Living Skills Survey (ILSS) and the MATRICS Consensus Cognitive Battery.

Results: There was no significant association between ILSS and EMA functioning. However, hierarchical regression analyses revealed significant cross-level interactions between attention/vigilance and EMA (b = .23, p < .05) as well as executive function (EF) and EMA (b = .29, p < .05), suggesting that attention and EF moderated the relationship between ILSS and the EMA functioning. EMA and ILSS were only significantly related in participants with t-scores over 40 for both attention (t = 2.41, p < .05) and EF (t = 2.63, p <.01).

Conclusions: Neurocognitive factors moderate the relation between EMA and self-reported functioning in individuals with schizophrenia. Our findings suggest that individuals with poorer EF and attentional abilities may be better suited for EMA assessment techniques, while those without impairments can use retrospective ratings.

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A. ECKFELD, L. KUSHAN, A. LIN, A. NAIR & C. BEARDEN. Neurocognitive and Social Cognitive Profiles of Early-Onset Psychosis and 22q11.2 Deletion Syndrome: Relationship to Functional Outcome.

Objective: Genetic models of psychosis risk may provide insight into the pathophysiology of schizophrenia (SZ) if intermediate phenotypes can be established. 22q11.2 Deletion Syndrome (22q11DS), a recurrent hemizygous deletion, may be a useful genetic model for early-onset psychosis (EOP), or overt psychosis emergence before age 18. We compared clinical symptomatology, functioning, and cognitive profiles of 22q11DS patients and EOP patients relative to healthy controls (HCs), and examined whether baseline cognitive performance predicted follow-up functioning.

Participants and Methods: 238 participants (n=51 EOP, 61 22q11DS, 126 HC) were assessed for current symptomatology, social and role functioning, and neurocognitive (NC) and social cognitive (SC)

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performance. A subset of participants was re-assessed 12 months later (n=131; n=25 EOP, 35 22q11DS, 71 HC).
Results: EOP patients had more severe clinical symptomatology than 22q11DS patients and HCs on all measures ($p<0.001$); both patient groups had similar impairment in functioning. On the majority of NC/SC measures, HCs performed significantly better than both patient groups ($p<0.01$) and EOP patients performed significantly better than 22q11DS patients. Among EOP patients, greater positive symptom severity was associated with poorer performance on measures of processing speed, vocabulary, IQ, and theory of mind; in 22q11DS patients, symptom severity was inversely correlated with vocabulary, IQ, verbal fluency, working memory, and emotion recognition/discrimination performance. Similar patterns of cognition-symptom relationships across groups were found. Better initial NC performance was associated with better role functioning at follow-up, but baseline NC and SC performance did not predict subsequent social or global functioning.
Conclusions: This study offers a unique first look into a broad comparison of deficits in EOP and 22q11DS samples relative to HCs, and the utility of initial cognitive deficits in predicting future outcome in these clinical populations.
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J. EGGER, A. HENDRIKS, Y. BARNES-HOLMES, G. JANSSEN, D. BARNES-HOLMES & C. MCENTEGGART. Social Cognition and Perspective Taking in Psychosis: Assessing Deictic Relational Responding Using the IRAP.
Objective: Social cognitive disorders and perspective-taking difficulties have been well documented in patients with psychosis. Relational Frame Theory (RFT) studies the learning processes involved in perspective-taking and has revealed specific patterns and difficulties for this clinical group. In the current study, we sought to study the strength and flexibility of perspective-taking relations in patients with psychosis, to further our understanding of their social-cognitive difficulties. Hence, we developed an Implicit Relational Assessment Procedure (IRAP) specific for deictic relations and psychotic symptoms. This Psychosis-IRAP was administered in both a clinical and a student sample.
Participants and Methods: The Psychosis-IRAP contrasted statements and questions referring to psychotic and normal experiences which participants responded to using one of two response options. The IRAP and a Faux-Pas (Theory of Mind) test was presented to two groups of participants: a clinical group with a diagnosis of psychosis (n=28) and a group of non-clinical controls (n=40).
Results: Nine out of twenty-eight participants had to be excluded for not meeting strict IRAP criteria for speed and accuracy. IRAP responding for each group was in the predicted direction. A ROC analysis showed that the IRAP correctly classified 80% of the individuals with psychosis with a sensitivity level of 84.2% and a specificity level of 27.8%.
Conclusions: The Psychosis-IRAP could be successfully used to classify this population and the study results indicated greater inflexibility in perspective-taking in individuals with psychosis. Focusing on psychopathology from the combined fields of affective neuroscience, social cognition, and RFT, as was done in this research, may be helpful for further refinement of clinical interventions. Here, it appears that treatment of patients with psychosis, in addition to psychopharmacological strategies, may benefit from targeting the relatively inflexible patterns of thinking with regard to self and other perspectives.
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V.G. FERNANDEZ, M. HODGES, R. ASARNOW & K. NUECHTERLEIN. Linguistic and Neurocognitive Correlates of Probabilistic Classification Learning in Schizophrenia.
Objective: The onset of schizophrenia is typically preceded by prodromal symptoms, during which communication disturbance can be detected (Bearden et. al., 2011). This study aimed to examine the relation between the Weather Prediction Task (WPT), a probabilistic classification task, and measures of linguistic and neurocognitive functioning that may be related to communication disturbance.
Participants and Methods: Participants were recruited from the UCLA Aftercare Program and met DSM-IV-TR criteria for Schizophrenia or Schizoaffective Disorder (SZ: N=34; 7f; Mean age=28.4±11), or were typically developing adults (TD: N=18, 7f, Mean age=27.5±8). None had a history of neurological disorder or intellectual disability. Each was administered the WPT; Woodcock-Johnson III Letter Word Identification (LWI) and Word Attack (WA); WAIS-IV Vocabulary (VC), Coding (CD), and Digit Span (DS); CELF-5 Sentence Assembly (SA) and Formulated Sentences (FS); and Trail Making Test (TMT) A and B.
Results: No significant group differences were found in age, sex, parental education, or race/ethnicity. The SZ group performed more poorly in all areas. Significant differences were found in WPT mean accuracy (t=-3.74***) and learning curve (F=4.46*), WA (t=-2.66**), FS (t=-3.29**), SA(t=-2.07*), DS (t=-3.51***), CD (t=-4.15***), and VC (t=2.69**). The SZ group demonstrated significant correlations, controlling for age, between WPT mean accuracy and DS (r=.48*), VC (r=.41*), CD (r=.39*), LWI (r=.48**), WA (r=.52**), FS (r=.40*), and SA (r=.38*). For the TD group, TMT B (r=-.63*) was significantly related to WPT. Note: *≤.05 **≤.01 ***≤.001
Conclusions: Results are consistent with existing research indicating that schizophrenia patients are impaired on the WPT task (Forde et. al, 2008). In schizophrenia patients, probabilistic classification learning is more closely related to auditory attention, language functioning, and processing speed than in controls whose performance on the WPT is related to sequencing and working memory.
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G. LUPAS, S. PAULRAJ, M. FISHER, S. VINOGRADOV & R. GOMEZ. Does Age Moderate the Relationship Between Neurocognition, Theory of Mind, Quality of Life, and Social Functioning in Schizophrenia?
Objective: The current study attempted to examine the role of biological age as a moderating variable for the previously established relationships between neurocognition, social cognition, and functional outcome for individuals with schizophrenia.
Participants and Methods: This study used cross-sectional archival data from an existing database of 244 community dwelling adults with schizophrenia from the San Francisco Bay Area, CA. Measures for the study included the Positive and Negative Syndrome Scale for assessing symptom severity, the Faux Pas test for assessing theory of mind (ToM), and the MATRICS Consensus Cognitive Battery for assessing neurocognition. Outcome measures included the Social Functioning Scale for assessing social functioning, and the abbreviated Quality of Life Scale for assessing quality of life. Multiple regression analyses were conducted to examine the relationships between age, neurocognitive functioning, ToM, and our outcome variables including social functioning and quality of life.
Results: Results indicated that neurocognition significantly predicts quality of life, and age moderates the relationship between neurocognition and quality of life. Similarly, we found that ToM accuracy predicts quality of life, and age moderates the relationship between ToM, and quality of life. However, the relationship between neurocognition and quality of life, and between ToM and quality of life was not as strong

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for older adults. We also found a synergistic effect of neurocognitive functioning, ToM, and age on social functioning.
Conclusions: The addition of a cognitive remediation and social cognition training component could improve functional outcome in younger adults living with schizophrenia, while such interventions may not be as useful for improving outcome for older individuals with the illness. Alternatively, treatment for older individuals with schizophrenia should focus more on other biopsychosocial treatment components for improving community functioning and promoting better quality of life.
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S. KANG, T.D. MARZOUK, P. WATSON, J. ZHANG & A. MALHOTRA. Relationship Between Clozapine and Clozapine Metabolite Levels and Cognitive Function in Treatment-Resistant Schizophrenia: A Pilot Study.
Objective: Cognitive dysfunction is a core feature of schizophrenia, and poses a particular challenge in treatment resistant schizophrenia (TRS). Clozapine is recommended for TRS but has been associated with cognitive side effects due to its anticholinergic properties, although the impact on cognition has been mixed and there is evidence that the active metabolite, n-desmethylclozapine (NDMC) may enhance cognition. The goal of this study was to determine the specific effects of clozapine and NDMC on domains of cognition.
Participants and Methods: Twelve participants who met DSM-V criteria for schizophrenia or schizoaffective disorders (7 males, 5 females; age = 30.53 + 12.68 years) were administered the MATRICS Consensus Cognitive Battery following 12 weeks of clozapine treatment. Clozapine and NDMC levels were obtained via peripheral blood sample.
Results: Clozapine and NDMC blood levels were positively correlated with better verbal learning ($r = 0.581$, $p = 0.048$; $r = 0.60$, $p = 0.039$) and social cognition ($r = 0.653$, $p = 0.021$; $r = 0.658$, $p = 0.020$). A lower ratio of clozapine to NDMC was correlated with better performance in reasoning and problem solving ($r = -0.616$, $p = 0.043$).
Conclusions: Our findings show both the clozapine compound and its metabolite NDMC are associated with cognitive function in TRS. The positive cognitive correlations occur in these domains despite clozapine's anticholinergic effects, suggesting that another mechanism may be involved in this relationship. Our findings lend support to the positive cognitive effects from a lower clozapine / NDMC ratio, suggesting a unique cognitive benefit from the pharmacodynamics of NDMC. Further research is needed to understand the specific mechanisms underlying this differential impact.
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M. MATSUI, Y. INADA, K. EBINA, Y. HIGUCHI & M. SUZUKI. Pilot study of cognitive reserve in Japanese patients with schizophrenia using Cognitive Reserve Index questionnaire.
Objective: Cognitive reserve could be defined as the accumulation of experiences, abilities, knowledge and changes that occur throughout the lifespan. Cognitive reserve has been developed mainly in the field of aging and dementia after it was observed that there appears to be no direct relationship between the degree of brain pathology and the severity of clinical manifestations of this damage. The present study applies the concept of cognitive reserve to schizophrenia, aiming to assess it quantitatively.
Participants and Methods: Participants were 19 patients meeting ICD-10 criteria for schizophrenia (S) and 20 healthy controls (C) matched for age. The average age was 37.3 ± 13.0 (SD) (S) and 38.0 ± 12.0 (C) years old, and the average years of education was 14.2 ± 2.1 (S) and 16.2 ± 2.4 (C) years. We administered the Japanese Adult Reading Test (JART). Cognitive reserve was assessed using the Cognitive Reserve Index questionnaire (CRIq; Nucci et al, 2012). The CRIq includes 20 items grouped into three sections, education, working activity, and leisure time, each of which returns a subscore. CRI (total CRIq score) was the average of the three subscores.
Results: We compared each subscore of CRIq, CRI, and IQ assessed by JART between two groups. CRI of patients was lower than that of controls (89.6 ± 5.4 vs 97.6 ± 6.6, $p<.01$). Both education and working activity index of patients were lower than those of controls (education 97.7 ± 8.8 vs 104.1 ± 9.9, $p<.05$; working activity 90.8 ± 4.7 vs 99.4± 7.4, $p<.01$). There were no significant differences of leisure time index and IQ by JART between groups (leisure 88.1 ± 8.1 vs 91.4 ± 6.9; IQ 103.9 ± 10.0 vs 109.7± 7.3).
Conclusions: Lower scores of cognitive reserve were observed in patients with schizophrenia than in healthy controls. Cognitive reserve index may play a role of better understanding in schizophrenia and furthermore it is necessary to consider whether cognitive reserve predicts cognitive functions and clinical symptoms.
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T.T. NGUYEN, S.C. LIOU & L.T. EYLER. Blood-based Biomarkers of Inflammation are Related to Processing Speed and Executive Function in Schizophrenia.
Objective: Schizophrenia (SZ) has been increasingly recognized as a multi-system disorder, involving not only cognitive and psychiatric symptoms but also physical symptoms, which are interrelated. Recent research suggests a central role for inflammatory mechanisms in cognitive dysfunction across different populations, including aging and Alzheimer's disease. The present study investigated the relationship between peripheral immune markers and cognition in SZ.
Participants and Methods: Outpatients with SZ (n=19) and healthy comparisons (HC; n=20; ages 20-55) provided blood samples for assays of pro-inflammatory cytokines and completed neuropsychological tests of processing speed and executive function (D-KEFS Trail-Making). We examined group differences in tumor necrosis factor-α (TNFα), interferon gamma (IFNγ), and interleukin-6 (IL-6), and their relationships to cognitive performance between SZ and HC groups.
Results: SZ patients had higher levels of TNFα, but not IL-6 or IFNγ, than HCs. TNFα and IFNγ interacted with group on measures of processing speed ($ps \leq 0.02$). SZ patients with higher levels of TNFα and IFNγ demonstrated worse visual scanning and visuomotor sequencing; no relationship between these cytokines and processing speed was observed in HCs. Similarly, IL-6 interacted with group on a measure of executive function (p=0.02) such that SZ patients with elevated IL-6 demonstrated worse cognitive flexibility; no relationship was seen in HCs. MRI data were also collected; results of ongoing analyses will be presented.
Conclusions: Findings suggest that elevated systemic inflammation may be a risk factor for slowed processing speed and executive dysfunction in SZ. This is consistent with previous research, which has indicated that inflammation may contribute to frontosubcortical dysfunction, and suggests that the immune system may play a role in cognitive aging in SZ. Interventions that target shared mechanisms underlying both body and brain health could hold great promise for improving outcomes in SZ patients with SZ.
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A. GÓMEZ-GASTIASORO, L. ZUBIAURRE-ELORZA, J. PEÑA, N. IBARRETXE-BILBAO, O. RILO, D.J. SCHRETLEN & N. OJEDA DEL POZO. White Matter Fractional Anisotropy Differences Between Psychiatric Patients with and Without Suicide Attempts and Their Relationship with Impulsivity.
Objective: This study aimed to investigate brain white matter (WM) differences between psychiatric patients with and without history of attempted suicide. We also sought to correlate any observed group differences in fractional anisotropy (FA) with measures of impulsivity.

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Participants and Methods: We recruited 41 adults with schizophrenia (SZ) (10 attempters and 31 non-attempters) and 20 with schizoaffective disorder (SZA) (12 attempters and 8 non-attempters) as part of a larger study. We used FMRIB Software Library (FSL) to assess whole brain WM differences between attempters and non-attempters separately in the SZ and SZA subgroups. Results were saved in a mask and mean FA values were exported to SPSS. We then correlated FA values in regions that distinguished attempters from non-attempters with Barrat Impulsivity Scale (BIS-II; Patton, Stanford, & Barratt, 1995) scores for the Attentional, Motor, and Nonplanning impulsivity factors.
Results: SZA attempters showed significantly higher mean FA than non-attempters in the right frontal hemisphere (FWE-corrected, $p < .05$), including associative and projective fibers, and in cerebellar WM. Higher mean FA in the frontal area correlated with higher attentional impulsivity in attempters ($r = .706$; $p = .010$) but not in non-attempters. SZ attempters showed lower mean FA than non-attempters (FWE-corrected, $p < .10$) in some parieto-occipital areas bilaterally, but these FA values did not correlate with any BSI-II factor score.
Conclusions: Results point to WM differences between psychiatric suicide attempters and non-attempters with SZA disorder but not SZ. Higher mean FA in SZA attempters correlated with greater attentional impulsivity, suggesting a possible relationship between deficient dendritic or axonal pruning and both suicide attempts and impulsivity in SZA.
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Z. MAHMOOD, A.V. KELLER, C.Z. BURTON, L. VELLA, G.E. MATT, S.R. MCGURK, R.V. PATTEN & E.W. TWAMLEY. Neuropsychological Predictors of Supported Employment Outcomes in People with Severe Mental Illness.
Objective: In people with severe mental illnesses (SMI), neuropsychological abilities may contribute to vocational outcomes, including job attainment, job tenure, and wages earned. We aimed to determine the strongest predictors of work outcomes in 153 people with SMI (38% schizophrenia [SZ], 24% bipolar disorder [BD], 38% major depression [MD]) who were participating in a two-year supported employment study.
Participants and Methods: Tests of neuropsychological performance (MATRICS Consensus Cognitive Battery along with tests of executive functioning, prospective memory, and premorbid IQ), functional capacity (UCSD Performance-Based Skills Assessment-Brief), social skills (Social Skills Performance Assessment), and psychiatric symptom severity (Positive and Negative Syndrome Scale; Hamilton Depression Rating Scale) were administered at baseline. Work outcomes (job attainment, weeks worked, and wages earned) were collected weekly for two years.
Results: Logistic regression determined that independent of years of educational attainment, psychiatric diagnosis, and estimated intellectual functioning, more recent work history and less severe negative symptoms significantly predicted job attainment during the two-year study, in a model accounting for 26% of reduction in log-likelihood. Of the 47% who obtained jobs, better global neuropsychological performance (i.e., lower global deficit score) predicted greater weeks worked (overall model fit improved by 14%). Better global neuropsychological performance, along with more recent work history, also predicted higher wages earned, accounting for 14% of reduction in log-likelihood.
Conclusions: Modifiable predictors of supported employment outcomes included cognitive functioning and negative symptom severity; thus, interventions to improve these factors may enhance work outcomes and decrease the loss of productivity associated with SMI.
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A. PETERSSON, K. GICAS, K. WACLAWIK, T. O'CONNOR, E. LIVINGSTON, A. JONES, P. JONES, O. LEONOVA, W. PANENKA, R. PROCYSHYN, D. LANG, A. BARR, G. MACEWAN, A. THORNTON & W. HONER. Psychosis as a Marker of Neurocognitive Decline in Marginally Housed Persons.
Objective: Decline in memory and processing speed has previously been associated with psychotic illness. Yet, it is unknown if the psychotic state itself is associated with deterioration. Our objective was to ascertain if the time spent in a psychotic state predicted neurocognitive decline in a community sample of marginally housed persons.
Participants and Methods: Participants (N=220; age M=43.9 years; 77% male) were enrolled in a longitudinal study of multimorbidity in marginally housed polysubstance-using persons in Vancouver, Canada. Comprehensive neurocognitive and psychiatric assessments, including the Hopkins Verbal Learning Test Revised (HVLT-R), the Stroop Color-Word Test (STROOP), and an abbreviated version of the Positive and Negative Syndrome Scale (mini-PANSS), were conducted annually (neurocognitive tests) and monthly (mini-PANSS). Proportion of time spent in psychosis was calculated by dividing the number of months a participant was psychotic by the number of months monitored. Change scores for STROOP (color-word trial) and HVLT-R (immediate recall) were calculated. Data from the first 3 years of monitoring were analyzed using hierarchical multiple regression.
Results: In models adjusted for pre-screened confounding factors (age and sex for STROOP; sex and history of traumatic brain injury for HVLT-R) and baseline cognition, the proportion of time spent in psychosis during the 36-month study period (M=0.42, SD=0.35) did not predict decline in performance on the STROOP ($F(1,182)$=3.25, p=.07) or HVLT-R ($F(1,173)$=0.17, p=.68) measures.
Conclusions: Among polysubstance-using marginalized adults, the proportion of time spent in a psychotic state during the first 3 years of monitoring was not associated with decline in memory or processing speed. This suggests that time spent in psychosis is not a reliable marker of cognitive decline in this population. Future studies verifying if these findings generalize to longer durations of monitoring are recommended.
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I. RUIZ & G.P. STRAUSS. A Meta-Analysis of Standardized Neuropsychological Effort Test Performance in Psychotic Disorders.
Objective: Performance Validity Tests (PVTs) are frequently used to determine inadequate effort in neuropsychological evaluations. These tests are believed to be valid for use in a range of neuropsychiatric disorders, including those with severe cognitive impairment. However, recent findings call into question whether these tests are valid for use in psychotic disorder populations, where failure rates vary widely across samples (from 0-72%), are moderately correlated with IQ, and appear to differ in relation to test (i.e., embedded vs. freestanding PVTs), demographic (e.g., age, sex), and clinical (e.g., symptoms, inpatient/outpatient status, medication) characteristics. A meta-analysis was conducted to draw conclusions about the validity of neuropsychological PVTs in psychotic disorders by determining the aggregate failure rate and moderators of failure in the literature.
Participants and Methods: A total of 19 published studies employing at least one PVT and a total sample size of 2,245 psychotic disorder patients was included in the meta-analysis.
Results: Using a random effect model, results indicated a pooled weighted PVT failure rate of 14%. Moderator analyses indicated that IQ scores significantly predicted PVT failure rate; however, no other moderators were significant, including effort test type (freestanding vs. embedded), forensic status (litigating vs. non-litigating), hospitalization status (inpatient vs. outpatient), demographics (age, sex, education), medication (prescribed antipsychotic vs. not), and symptoms (positive, negative).

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Conclusions: These results suggest that a nontrivial proportion of patients with psychotic disorders fail PVTs. However, the patients who fail are those with lower IQ and genuine cognitive impairments, calling into question the validity of neuropsychological PVTs as measures of effort in this population.
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A. TETI, P.C. GRAHAM, J.M. FISZDON, N. PARANAMANA, L.C. HABER, A. DONOVAN, J.E. MERVIS, G.D. PEARLSON & J. CHOI. Time-Based Prospective Memory Deficits in Adolescents at Clinical High Risk for Psychosis.
Objective: While prospective memory (PM) is crucial for the maintenance of daily functioning, deficits in time and event-based PM have been found in adults with established psychosis (schizophrenia; SCZ) and younger adutls recently diagnosed with schizophrenia (first episode psychosis; FEP). Time-based PM, in particular, was found to be more impaired in both groups than event-based. These differences have been hypothesized to be attributed to differences in attentional ability. It is currently unclear if similar differences are found at an earlier prodromal stage of psychosis such as teenagers at clinical high risk (CHR).
Participants and Methods: Participants included 25 teenagers at CHR (16-19yo), 20 young adults with FEP (18-21yo), 39 adults with SCZ (21-55yo), and 29 healthy controls (18-24yo). PM was assessed using the Cambridge Test of Prospective Memory (CAMPROMPT) while attention as gauged using the Continous Performance Test-Identical Pairs (CPT-IP), with differences in PM calculated using pairwise comparisons (Tukey test).
Results: CHR performanced worse on time-based PM compared to healthy controls (F=2.21, p=.038) while event-based PM was found to still be relatively intact (F=.427, p=.200). Compared to FEP and SCZ, CHR presented with similar time-based PM impairment to FEP, but it was not as severe as SCZ. Time-based PM impairments mirrored performances in attention, as CHR and FEP had similar attentional impairments compared to healthy controls (P's<.036), but again, not as severe as SCZ.
Conclusions: Findings support the theory that time-based PM deficits can present at a much earlier stage of psychosis than event-based PM, which correlates with the progressive decline in attention. Furthermore, the difference between time and event-based PM indicates that different cognitive processes, possibly attention, are involved to complete each task.
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G.M. VALTIERRA, K. KNUDSEN, Y. KENETT, S. BOOKHEIMER & R.M. BILDER. Schizotypy and Semantic Distance in Convergent Creative Thinking.
Objective: This study aimed to determine if there is a correlation between schizotypy and semantic retrieval processes during convergent thinking in exceptionally creative (Big C) individuals.
Participants and Methods: Participants belonged to three groups: Big C Visual artists (VIS), Big C Scientists (SCI) and a Smart Comparison Group (SCG) ($N = 99$). We measured schizotypy with the Schizotypal Personality Questionnaire (SPQ), and convergent thinking with the Remote Associates Test (RAT). We used Latent Semantic Analysis to compute the semantic distance between participants' RAT responses and the correct response (RAT distance; higher = farther from correct response). We also calculated the total correct RAT responses (RAT total). We hypothesized that schizotypy would be positively associated with RAT distance and negatively associated with RAT total.
Results: RAT distance, but not RAT total, correlated with SPQ Cognitive-Perception (SPQC) ($r(29) = .40$, $p < .03$) in SCI, and with SPQ Interpersonal in the SCG ($r(22) = .52$, $p < .004$). SPQ total was higher in VIS ($M = 19.8$, $SD = 14.3$) than SCI ($M = 10.6$, $SD = 7.8$) and SCG ($M = 12.2$, $SD = 10.0$), $F(2, 96) = 6.95$, $p < .002$. Post-hoc analysis Bonferroni corrected showed that VIS ($M = 8.0$, $SD = 7.7$) scored significantly higher than SCI ($M = 2.7$, $SD = 3.0$) on the SPQC factor, and that VIS ($M = 6.2$, $SD = 4.1$) outscored SCI ($M = 3.5$, $SD = 3.2$) on the Disorganization factor.
Conclusions: The significant group differences in SPQ total scores and factors suggest that schizotypy may benefit visual arts, but not sciences. The associations of SPQ with RAT distance suggests both may be linked to creative thinking, while the lack of association between SPQ and RAT total suggests that the relationship between schizotypy and creativity is not mediated by convergent thinking. Further research is needed to investigate the possible association of schizotypy with divergent thinking.
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L.A. MISTLER, Y. ZISMAN-ILANI, C. WILLIAMS & R.M. ROTH. Exploring the Relationship Between Cognitive Factors and Engagement in Shared Decision Making in People with Serious Mental Illness.
Objective: Serious mental illnesses (SMI) affect about 9.8 million US adults and result in costly hospitalizations for treatment. Of those with SMI who were hospitalized between 2005 and 2014, about 15-22% were readmitted within 30 days of discharge. Improving the transition from hospitalization to outpatient care by including patients in decisions about treatment could reduce the readmission rate. In psychiatry, shared decision making (SDM) has been found to facilitate patient involvement in care and perceived satisfaction with decisions. There is widespread belief, however, that many patients with SMI cannot engage in and benefit from SDM due to cognitive or motivational deficits. We therefore reviewed the literature in order to determine what empirical research, if any, has investigated the relationship between cognitive and motivational factors and healthcare decision making in SMI.
Participants and Methods: A systematic literature search of Medline/Ovid, Cochrane, Web of Science, and PsycInfo on SDM and mental health treatment was conducted. Articles needed to address SMI, cognition or motivation, and healthcare decision making in order to be included.
Results: Of 1882 titles and abstracts, 1731 were excluded based on eligibility criteria such as age, relevant diagnosis, and type of decision making (e.g., legal, medical). A further 144 were excluded after full text review. The remaining 7 articles were divided between three authors for data extraction. None directly examined cognitive or motivational deficits in relation to SDM in SMI.
Conclusions: A growing literature supports the benefits of SDM in patients with SMI. Despite this, we were unable to identify any studies examining whether cognitive or motivational factors could interfere with the capacity of those with SMI to participate in and benefit from SDM. Empirical research is needed to determine whether and how cognitive and motivational factors are associated with SDM outcomes in patients with SMI.
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AM Coffee Break

10:30–10:45 a.m.

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Plenary B. Advances in Neurotechnology for Neurocognition: Balancing on the Tightrope of Discovery, Treatment, and Translation

Presenter: Judy Illes

10:45–11:45 a.m.

J. ILLES. Advances in Neurotechnology for Neurocognition: Balancing on the Tightrope of Discovery, Treatment, and Translation.

This is a critical time in the history of discovery science and clinical care for patients with disorders of the brain and behavior. Neurotechnologies for modulating brain function and treating neurologic and psychiatric disorders are not only being newly developed, but earlier experimental technology is being re-modeled. The pace of this evolution is unprecedented: advances of the past 75 years far exceed those of the 2000 before them, and advances of the past 15 years exceed even those of the past 75. In this lecture, I will situate a series of studies focused on invasive and non-invasive approaches to modulating brain function in this context. I will discuss research that has generated news coverage of psychiatric neurosurgery from 1960-2016, reader reactions to news media, and multinational public opinion derived from extensive interviews and focus groups conducted around the world. I will also present evidence suggesting that, alongside the development of neurosurgical and wearable devices to intervene on neurocognition, there is a trend to legally protect their applications to the brain through broadly-written methods and device patents. Some of these are crossing a thin line of protecting brain biomaterial and regions. As I triangulate the findings of the various studies, I will consider the neuroethical questions they raise, and the impact they have on health care providers, patients, citizens, and society.

Learning Objectives

1. Describe principles and strategies for research and clinical neuroethics inquiry relevant to neuropsychologists.
2. Explain trends in invasive and non-invasive approaches to mental health, neurodegenerative, and other disorders of the brain that have a neurocognitive component.
3. Discuss roles of and responsibilities of health care professionals in this exciting time in the neurological sciences for ensuring benefits, privacy, and justice for patients and families.

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Paper Session 2. Neurodevelopment & Neurodevelopmental Disorders

Moderator: Robin L. Peterson

11:45 a.m.–1:15 p.m.

J. SCOTT, A.F. ROSEN, T.M. MOORE, D. ROALF, T.D. SATTERTHWAITE, M.E. CALKINS, K. RUPAREL, R.E. GUR & R.C. GUR. Cannabis Use in Youth is Associated with Limited Alterations in Brain Structure.

Objective: Frequent cannabis use during adolescence has been associated with alterations in brain structure. However, studies have featured relatively inconsistent results, predominantly from small samples, and few studies have included less frequent users to examine structural brain alterations across level of cannabis use.

Participants and Methods: High-resolution T1-weighted MRIs were obtained from youth aged 14-21 years (n=781), who were studied as part of the Philadelphia Neurodevelopmental Cohort. This sample including 147 cannabis users (109 Occasional [≤1-2 times per week] and 38 Frequent [≥ 3 times per week]) and 634 cannabis Non-Users. Several structural neuroimaging measures were examined in whole brain analyses, including gray and white matter volumes, cortical thickness, and gray matter density. Established procedures for stringent quality control were conducted, and two automated neuroimaging software processing packages, Advanced Normalization Tools (ANTs) and FreeSurfer, were used to ensure robustness of results.

Results: After false discovery rate correction, there were no significant differences by cannabis group in global or regional brain volumes, cortical thickness, or gray matter density, and no significant group by age interactions were found. Follow-up analyses using equivalence testing and bootstrapping indicated that the values of structural neuroimaging measures by cannabis group were similar, and differences among groups were likely to be of a small magnitude.

Conclusions: Cortical thickness, brain volume, and gray matter density were similar among adolescents and young adults who were cannabis non-users, occasional cannabis users, and frequent cannabis users. Our data converge with prior large-scale studies suggesting small or limited associations between cannabis use and structural brain measures in youth. More detailed studies of vulnerability to structural brain alterations and longitudinal studies examining long-term risk are indicated.

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J. PAN, K. SAWYER, E. MCDONOUGH, L. SLOTPOLE & D. GANSLER. Language Contributions to Executive Functioning in Typical Neurodevelopment.

Objective: Executive functioning (EF) refers to the higher level metacognitive functions involved in the regulation and management of lower-level cognitive processes and goal-directed behaviors. Language and verbal abilities have long been theorized to contribute to the development of behavioral regulation and decision making. However, whether or not language may mediate the relationship between brain structures and executive skills has not been assessed in a single integrative model combining both neuroanatomical and cognitive variables. The objective of the present study is to demonstrate evidence for language as a mediator between brain networks and EF ability.

Participants and Methods: In the present study, cognitive and structural neuroimaging data from the right-handed participants with 3+ years of education from the Pediatric, Imaging, Neurocognition, and Genetics (PING) study were examined (n = 684). Of the retained sample, data from 273 participants (40%) were used for exploratory factor analysis (EFA), and data from 411 participants (60%) were used for confirmatory factor analysis (CFA) in structural equation modeling (SEM) and bootstrapping.

Results: Results of the EFA and CFA measurement models supported the use of latent variables to represent both brain networks (i.e, frontoparietal and temporal networks) and cognitive domains (i.e., EF and language). The final CFA structural model yielded adequate model fit (X^2/df = 3.53; CFI = 0.95; RMSEA = 0.08) and indicated that language mediates 47% the relationship between EF and the frontoparietal network. These results were supported by bootstrapped 95% confidence intervals.

Conclusions: Findings from the present study indicate that language indeed mediates the brain-EF relationship in typical neurodevelopment. From a clinical standpoint, these results highlight the potential for teaching verbal mediation as a cognitive-behavioral intervention for children and adolescents with executive deficits.

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S. LIPSHATZ ESHWEGE, R. GEVA & R. SCHIFF. Relations of Inhibition Control and Emotion Recognition to Peer Interaction in Children with ADHD.

Objective: Children with ADHD (Attention Deficit Hyperactivity Disorder) have poor quality of friendships. They are found to have fewer friends and tend to be more socially rejected. Additionally, they exhibit difficulty inhibiting thoughts and responses, and have poorer understanding of others. In order to understand the challenges facing children with ADHD in forming stable friendships, we explored how inhibition control and emotion recognition relate to peer interaction in children with ADHD compared to controls during competitive play.

Participants and Methods: Using a cross-sectional design, 66 11-13-year-old participants (42 with ADHD and 24 controls) were evaluated on 3 computerized gaze tracking tasks measuring: emotional recognition, response inhibition and interference control; and a semi-structured competitive peer play.

Results: Results indicated that children with ADHD showed poorer response inhibition and interference control, and fixated their gaze less efficiently as compared to controls. Additionally, during peer interaction, children with ADHD showed less pro-social behavior, social eye contact, and affect gestures, but showed better compliance with rules. Among children with ADHD, but not controls, inhibitory control difficulties were associated with more negative social behavior during their peer interaction. Comparatively, in controls, but not in children with ADHD, difficulties in emotion recognition were associated with fewer pro-social behaviors toward a close friend.

Conclusions: Findings suggest that while children with ADHD strive to withhold an inappropriate response towards a close friend to maintain the friendship, they have difficulties in expressing prosocial gestures towards them. Furthermore difficulties in response inhibition and interference control, affect the quality of friendship in childhood ADHD.

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N. SCHIAVONE, M. VIRTA, J. LAUNES & L. HOKKANEN. Subthreshold ADHD Symptoms in Childhood and Neuropsychological Functioning in Adulthood in a Perinatal Risk Cohort.

Objective: Prior studies suggest adults with subthreshold ADHD symptoms not to be impaired in neuropsychological functioning, but little is known about the long-term effects of childhood subthreshold ADHD symptoms on cognition. This study investigates cognitive performance of 40-year-old adults with subthreshold ADHD symptoms in childhood. Factors possibly contributing to cognitive performance in adulthood, including childhood socioeconomic status (SES), gender, and childhood IQ, were also examined.

Participants and Methods: Participants were part of a longitudinal study examining the impact of perinatal risks on cognition. A total of 218 participants (118 females) were included in the study, 55 of whom had subthreshold ADHD symptoms as children. ADHD symptoms were gathered at 5 and 9 years of age from multiple observers and environments. WISC total IQ was assessed at 9 years. Cognitive performance at 40 years was assessed with WAIS-IV Full Scale Intelligence Quotient (FSIQ), verbal comprehension and perceptual reasoning; WMS-III Logical Memory; and Trail Making Test-B.

Results: No significant group differences on the outcome variables emerged after controlling for gender, childhood SES, and IQ at 9 years. Gender, childhood SES and IQ at 9 years were significant predictors of FSIQ at 40 years ($p < .001$, $R^2 = .49$). Adding subthreshold ADHD symptoms to the model resulted in a significant but minor improvement in predicting FSIQ ($R^2 = .50$, change $p = .04$). Subthreshold ADHD symptoms did not provide unique variance in predicting the other measures.

Conclusions: Our results suggest that as a group, adults with perinatal risks who had subthreshold ADHD symptoms in childhood perform similarly in cognitive tasks to adults with no childhood ADHD symptoms. Childhood SES, gender, and childhood IQ predicted adulthood IQ better than subthreshold ADHD symptoms. These results imply that non-clinical levels of ADHD symptoms in childhood do not affect neuropsychological performance in midlife in a population with perinatal risks.

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E. SADIKOVA, K. CSUMITTA, S. SHAKIN, A. RATTO, A. ARMOUR, L. KENWORTHY, G. WALLACE & J. STRANG. Diagnostic Clarification of Youth with Co-Occurring Apparent Autism Spectrum Disorder and Gender Dysphoria.

Objective: Autism Spectrum Disorder (ASD) and Gender Dysphoria (GD) often co-occur; up to one-fifth of transgender youth report co-occurring ASD (Strauss et al., 2017). The nature of the co-occurrence is not understood, and theorists have questioned whether the apparent co-occurrence may be spurious. Some posit that youth with co-occurrence may not have "true" autism, but instead surface autism-like characteristics resulting from the social stress of being gender dysphoric (Turban & van Schalkwyk, 2018). Phenotypic clarification is critical in order to understand the nature of the apparent autism characteristics and to provide appropriate and specific care.

Participants and Methods: This study has curated the largest well-characterized sample of youth with the clinical diagnoses ASD and GD co-occurrence to date. Participants include 35 GD+ASD youth and 70 2:1 age-matched (within 1 year) participants with ASD, but not GD. Measures include the Social Responsiveness Scale, Social Communication Questionnaire, Child Behavior Checklist, verbal IQ estimate, and general demographics. False discovery rate (FDR) corrections were utilized for multiple comparisons.

Results: The two groups were indistinguishable (without FDR correction) on all ASD related measures (all $p>.05$), as well as verbal thinking skills as measured by verbal sub-domain scores in Wechsler Intelligence Scale Tests. GD+ASD youth showed greater internalizing symptoms than the cis-gender ASD group before FDR corrections. There was greater racial/ethnic diversity in the cisgender group (maintained after FDR correction).

Conclusions: Parents reported phenotypically consistent ASD characteristics between autistic cisgender and GD+ASD youth, including ASD related symptoms in early development. Differences in race and ethnicity ratios suggest potential referral barriers to youth of color with the GD+ASD co-occurrence. Current findings do not support a theory that these youth may have ASD-like characteristics that arise from GD social anxiety-related factors.

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T. HAMNER, E. ADEYEMI, L. CLASEN, J. GIEDD & N. RAITANO LEE. Aberrant cortical thickness and surface area characterization in Down syndrome: Contrasting findings from chronological and mental-age matched peers.

Objective: Down syndrome (DS) shows increased cortical thickness (CT) and reduced surface area (SA) compared to chronological age (CA) matched youth (Lee et al., 2016). Importantly, CT and SA have differing genetic etiologies and developmental trajectories (Raznahan et al., 2011) and are linked to IQ (Shaw et al., 2006). Mental age (MA) matching identifies aspects of cognition deviating from or similar to developmental level. The current study aims to elucidate aspects of the DS neuroanatomical phenotype using CA and MA comparison groups.

Participants and Methods: 31 children with DS (*M*age: CA=15.18; MA=7.73) were matched to CA (N=25; *M*age=15.16) and MA (N=25; *M*age=7.45) peers. Participants completed *T*1 weighted scans on a 3-T magnetic resonance imaging scanner. Z-scores were created for Total SA and Mean CT relative to both MA and CA controls. Two 2x2

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mixed-model ANOVAs were completed. ANCOVAs were completed with TBV covaried. Group differences were evaluated at the vertex level using linear regression.
Results: Interactions emerged for CA (F [1, 54]=35.64, $p<.001$] and MA (F [1,54] =13.41, $p<.001$) comparisons. Simple effects revealed reduced SA relative to CA and MA ($ps<.001$), increased CT for CA ($p<.001$), but *similar* CT for MA ($p=.55$). ANCOVA with TBV covaried yielded similar results. Vertex-level regressions (40,962 vertices per hemisphere) revealed a similar number of vertices with reduced SA for both CA (57%) and MA (55%). Far fewer vertices had greater CT when compared to MA (7%) vs CA (30%).
Conclusions: Significant differences exist for DS and CA. Compared to MA, significant SA differences exist but CT differences are subtle. SA in DS may reflect atypical development whereas CT may reflect developmental level. Increased CT may track slower cognitive maturation characteristic to DS, as a thicker cortex may be less efficient. Including MA-matched groups in future structural neuroimaging may provide novel insights into the nature of DS brain development (for an example in functional neuroimaging, see Jacola et al., 2014).
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Paper Session 3. Dementia

Moderator: Ozioma Okonkwo

11:45 a.m.–1:15 p.m.

J. VONK, R.J. FLORES VELASCO, D. ROSADO, C. QIAN, R. CABO, J. HABEGGER, K. LOUIE, E. ALLOCCO, A.M. BRICKMAN & J.J. MANLY. Semantic Network Function Captured by Word Frequency in Nondemented APOE ε4 Carriers.
Objective: Accurate identification of the earliest cognitive changes associated with Alzheimer's disease (AD) is critically needed. Item-level information within tests of category fluency, such as lexical frequency—how often a word occurs in daily language—harbors valuable information about the integrity of semantic networks affected early in AD. To determine the potential of lexical frequency as a cognitive marker of AD risk, we investigated whether lexical frequency of animal fluency output predicted APOE ε4 status among older non-demented African Americans.
Participants and Methods: Using logistic regression models, we analyzed mean number of items and mean lexical frequency among 230 individuals with (n = 85; age m = 68.1+7.2) and without (n = 145; age m = 68.1+7.2) the APOE ε4 allele, matched on gender and years of education. Mean lexical frequency was calculated for each individual based on the lexical frequency values—extracted from the SUBTLEXus database—of their produced words across 60 seconds, as well as per 10-second time bin.
Results: Lexical frequency predicted APOE ε4 status (p = .043, OR = 4.853; CI = 1.049-22.263), and was higher in carriers than non-carriers when analyzed as a mean score and within time bins ($p < .05$). In contrast, we found no group differences in number of items. Lexical frequency was particularly sensitive to ε4-status after the first 10 seconds of the 60-second animal fluency task.
Conclusions: With the premise that decline in semantic memory and conceptual formation occurs years before the clinical diagnosis of AD can be established, we found that psycholinguistic analysis of fluency data is uniquely sensitive to higher genetic risk for AD. Our ability to detect this subtle difference in cognitive function between healthy APOE ε4 carriers and non-carriers using a cross-sectional design is propitious; psycholinguistic features may hold value as a cognitive biomarker for identifying people at high risk of AD for clinical trials.
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K.N. WILSON, E. GUZMÁN-VÉLEZ, J. ANGELICA, K. WIGGS, S. ANYA & D. TRANEL. A Novel, Brief Intervention Reduces Stress in Caregivers of Individuals with Dementia.
Objective: Caregivers of individuals with dementia are at an increased risk for stress-related mental and physical illnesses. As the number of individuals with dementia continues to rise, there is a critical need to develop effective interventions for caregivers. This study investigated whether a brief, two-day intervention improved psychological health in caregivers of individuals with dementia.
Participants and Methods: Family caregivers (N=104) of an individual with dementia were randomly assigned to a two-day intervention or a waitlist-control group. The intervention used techniques aimed at fostering self-care for caregivers (e.g., acceptance, mindfulness) and improving communication between caregivers and individuals with dementia. Caregiver burden, perceived stress, anxiety, and depression were measured at baseline as well as 1, 3, and 6 months post-intervention.
Results: Almost all participants (91.5%) completed the six-month study. Results from hierarchical mixed effects modeling indicated a significantly greater reduction in perceived stress for the intervention group as compared to the control group, B = -2.84, t = -2.68, p = .008. Additionally, the intervention was considered by nearly all respondents to be helpful for managing challenging behaviors.
Conclusions: A low cost, two-day intervention shows promise for producing lasting improvements in the psychological health of dementia caregivers. Caregivers reported a significant and lasting reduction in stress, and also showed a reduction in their symptoms of depression (although not statistically significant). These findings suggest that it is possible to have a lasting impact on caregiver psychological health with an accessible, brief intervention, and this could have a positive effect on caregivers' overall quality of life when faced with the daunting challenges of caring for a loved one with dementia.
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W.S. KREMEN, J. ELMAN, M.S. PANIZZON, D.E. GUSTAVSON, C. FRANZ, M. SANDERSON-CIMINO & A. JAK. Cognition Predicts Progression to Amyloid Positivity in Amyloid-Negative Individuals.
Objective: Although the A/T/(N) framework is agnostic to the sequence of Aβ, p-tau, and neurodegeneration biomarkers, cognitive impairment is considered a consequence of the disease that appears late in the pathological process. However, changes in cognition may occur earlier than is commonly acknowledged. We hypothesized that if the sequence of these processes is variable and overlapping, cognitive function would predict progression to Aβ positivity (Aβ+) in Aβ- individuals. The A/T/(N) framework was intended to be modifiable, and this would suggest the need for modification.
Participants and Methods: Participants were 383 non-demented AD Neuroimaging Initiative (ADNI) participants who were Aβ- at baseline based on PET or CSF; 51 progressed to Aβ+. We tested models with the following predictors of progression to Aβ+: age; education; MCI status; time to last assessment; continuous Aβ and p-tau levels; *APOE* status. Cognitive predictors were the ADNI Memory composite (ADNI-MEM) and the Precinical Alzheimer's Cognitive Composite (PACC).
Results: Controlling for covariates, both cognitive measures still predicted progression to Aβ+ status (ADNI-MEM; $p<.028$; PACC, $p<.021$). In a smaller subset of Aβ- individuals with continuously measured CSF Aβ and p-tau (n=298), both biomarker levels predicted progression to Aβ+ but ADNI-MEM and PACC effects changed little ($p<.02$; $p<.057$).

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Conclusions: Cognition predicts progression to Aβ positivity even after controlling for Aβ and p-tau levels. It might be that amyloid biomarker thresholds are too high and ignore relevant subthreshold pathology. Additionally, A-/T+ individuals may be on the AD pathway as well because p-tau predicted conversion to Aβ positivity. Regardless, Aβ+ measures do not clearly precede detectable differences in cognition. Importantly, the results strongly suggest that cognition should not simply be viewed as a late-occurring endpoint in the AD pathway. Rather, it can be an important early predictor of risk, even earlier than the key biomarkers as currently measured.

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D.A. NATION, J.K. HO, S. DUTT & A. BLANKEN. New Method for Identifying Neuropsychological Decline Predicts Progression to Dementia Beyond Alzheimer's Biomarkers in Asymptomatic Elderly.

Objective: Recent Alzheimer's disease (AD) diagnostic guidelines underscore a need for methods to identify neuropsychological decline (NP decline) in asymptomatic elderly. We used regression-based longitudinal norming to identify older adults showing NP decline and examined the value of this method for predicting future dementia.

Participants and Methods: Using Alzheimer's Disease Neuroimaging Initiative (ADNI) data, we built regression equations predicting 12-month neuropsychological performance from baseline performance in a robustly normal sample (remained cognitively normal [CN] throughout participation). Tests were AVLT trials 1-5 total & 6-7 average, Trails A & B, and Animals & Vegetables. Normative equations were applied to 1,074 subjects to obtain z-scores for NP decline representing worse than expected performance over 12-months. Cox regression evaluated incremental predictive utility of NP decline predicting future dementia beyond diagnosis and biomarker profile. Covariates were demographics, baseline diagnosis and AD biomarkers. Receiver operating characteristics (ROC) curves identified optimal z-score cutoffs. Cluster and discriminant function analyses identified patterns of NP decline.

Results: NP decline significantly predicted future dementia beyond covariates, X^2=28.2, p=<.001, OR=2.36, regardless of diagnosis or biomarker profile. ROC curves identified an optimal z-score cutoff of -0.576 for CN older adults, roughly corresponding to values falling at or below the 28th percentile of the normative sample. Cluster analysis revealed that 91.3% of CN decliners exhibited a decline pattern consistent with a dysexecutive/mixed and amnestic/dysnomic profile.

Conclusions: NP decline can be identified in older adults using 6 brief tests, and those exhibiting decline are at increased risk for dementia regardless of their baseline diagnosis or AD biomarker profile. Cluster-derived NP decline profiles revealed greater dementia risk in those with more widespread patterns of decline across cognitive domains.

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L. YEUNG, C. HALE, A. VINA ALBARRACIN, B.S. LAST, H. ANDREWS, L.S. HONIG, S.A. SMALL & A.M. BRICKMAN. Cerebrospinal Fluid Levels of Amyloid and Tau Are Independently Associated with Delayed Retention Memory in Non-Clinical Older Adults.

Objective: New diagnostic formulations define Alzheimer's disease (AD) in terms of abnormal levels of amyloid and tau biomarkers. These levels vary widely among cognitively healthy older adults, ranging from normal levels to levels suggesting preclinical disease. Among older adults without dementia, we aimed to (1) elucidate the relationship between biomarker levels and declarative memory, assessed with ModRey, a novel list-learning task designed for normal and preclinical populations; (2) compare the association between AD biomarkers and performance on ModRey versus the widely-used Selective Reminding Test (SRT); and (3) determine whether amyloid and tau biomarkers have interactive or independent effects on memory.

Participants and Methods: Forty-eight older adults without dementia (mean age: 69.8, 21 women) received the ModRey and the SRT to assess memory. Cerebrospinal fluid was obtained via lumbar puncture and amyloid and tau levels were measured on the Innogenetics Luminex bead-based multiplex (multi-analyte) platform.

Results: Lower amyloid and higher tau levels were reliably related to retention scores on ModRey but not to performance on the SRT. Amyloid and tau levels were independently associated with ModRey performance, without any interactions

Conclusions: Individual differences in CSF amyloid and tau levels are independently associated with memory functioning, even among non-demented individuals and at generally non-pathognomonic levels. The findings also suggest that the ModRey, our novel list-learning test, may be more sensitive and specific to AD-related pathology

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R.J. FLORES VELASCO, J. AVILA, N. SCHUPF, R. MAYEUX & J.J. MANLY. Early Life Socio-Economic Status as a Predictor of Incident Dementia and Mortality in Late-Life.

Objective: Adverse childhood environments in which basic needs are unmet, or with low parental investment, are known to negatively impact cognition and health not only in childhood, but also in late life. While many studies examine childhood socioeconomic risk factors individually, this study determines the simultaneous impact of multiple childhood SES indicators on risk for dementia and mortality. We hypothesized that higher early SES would predict lower risk of dementia and higher survival.

Participants and Methods: Participants were 4638 non-Hispanic White (NHW), non-Hispanic Blacks, and Hispanics in a community-based study of aging and dementia, age 65+ and not demented at baseline. A composite variable was created to represent early life socioeconomic status that included mother's and father's occupation and education and number of siblings. Cox regression estimated the effect of early life SES on dementia conversion and mortality, using years from baseline to event (or last visit) as the time scale, while covarying for age at baseline, sex/gender, and race/ethnicity.

Results: Early life SES was associated with a lower risk of developing incident dementia (β = -0.199; 95% CI = 0.717 - 0.938) after adjustment for confounds. Stratified analyses revealed that this relationship was present in Blacks and Hispanics, but not NHW. Men, non-Hispanic Blacks, and those who were older at baseline had increased mortality, but early life SES was not associated with survival (β = -0.011; 95% CI = 0.914 - 1.071).

Conclusions: A composite variable for early SES predicted incident dementia in this diverse cohort of older adults. Contradictory to our hypotheses, childhood SES did not predict mortality in late life. Our future research will investigate potential socioeconomic, education, biological, or psychosocial pathways by which early life factors influence late-life cognitive outcomes.

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Paper Session 4. Schizophrenia

Moderator: Jimmy Choi

11:45 a.m.–1:15 p.m.

J. CHOI, P.C. GRAHAM, M. DEASY, J.M. FISZDON, L. HABER, M.C. STEVENS & G.D. PEARLSON. Pupillometry-based Neurofeedback Cognitive Training for Teenagers at Clinical High Risk for Psychosis.

Objective: Deficits in processing speed (PS) have found to be correlated with social aptitude in teenagers at clinical high risk for psychosis (CHR) and variably identified as risk markers for psychosis. We examined the feasibility of improving information processing relevant to social situations in CHR using a novel neurofeedback cognitive training program, including its sustainability at 6 months, and its association with concurrent social function. Processing speed training (PST) is a newly developed tablet-based program that specifically targets information processing efficiency. It uses an algorithm combining task performance with pupillometry-based indices of arousal to adaptively adjust training parameters in order to maintain optimal neurocognitive load. This approach is more sensitive to effort than traditional performance-only algorithms, as we have shown it to be associated with greater treatment adherence and durable improvements in PS and on multiple measures of social function.

Participants and Methods: Ninety-seven CHR participants, age 12 to 19yo, were randomized to PST for 2 months (2x/wk, 40 min each session) or an active control matched for training format and the same dose and duration of treatment.

Results: PST group showed faster motorical and non-motorical PS at post and 6 months (F [7,79]=3.79, p=.016). Subsequent results in social functioning at 6 month follow-up showed PST reporting better overall social adjustment. Of note, changes in PS from baseline to 2 months were correlated with less social avoidance regardless of group assignment. Furthermore, processing speed at baseline predicted social adjustment outcome at post even after accounting for variance attributable to group assignment and symptoms.

Conclusions: This is one of the first studies to test focal neurofeedback cognitive training in a putatively prodromal phase of psychosis to address social morbidity. Targeting PS appears to be a promising pathway to improving co-morbidity and mitigating a risk factor for psychosis.

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S.V. CLARK, A. TANNAHILL, V.D. CALHOUN & J.A. TURNER. Reduced Cerebello-Cortical Resting-State Functional Connectivity in Schizophrenia and its Relationship to Performance on the MATRICS Consensus Cognitive Battery.

Objective: The cognitive dysmetria theory posits that cognitive deficits in schizophrenia are related to dysfunctional cerebello-cortical communication. Reduced cerebello-cortical functional connectivity has been observed in schizophrenia, but it is unclear how connectivity is related to cognition. This study investigated differences between healthy controls (HC) and individuals with schizophrenia (SZ) in cerebello-cortical resting-state functional connectivity and relationships between connectivity and cognition.

Participants and Methods: Eighty-five HC and 73 SZ participants underwent resting-state MRI and cognitive testing (MATRICS Consensus Cognitive Battery; MCCB). Seed-to-voxel functional connectivity was calculated between 20 cerebellar lobules and the whole brain. Group differences in connectivity were computed using t-tests in SPM8. Eigenvariates were extracted from significant clusters (p_{FWE}<.05) and regressed against MCCB scores controlling for age and head motion.

Results: HCs demonstrated better performance on all MCCB domains and stronger connectivity between several regions. No regression results pass Bonferroni correction but several results with p<.01 were observed. Visual learning and attention demonstrated a positive relationship with lobules VIIb/VIII – frontal/parietal connectivity in HC but negative or no relationship in SZ. Visual learning and attention showed positive main effects on lobules V/VIIIb – precuneus/superior temporal gyrus connectivity.

Conclusions: Relationships between reduced cerebello-cortical connectivity and poor performance on cognitive tasks in SZ support cognitive dysmetria. This is the first study to investigate cerebello-cortical connectivity in all lateral cerebellar lobules and connect reduced connectivity to MCCB performance, specifically in visual attention and learning. Results partially support and extend previous work showing aberrant cerebellar activity during cognitive tasks and relationships between cerebello-cortical connectivity and executive function in schizophrenia.

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S. SILVERSTEIN, D. DEMMIN, M. ERICKSON, D. SMITH & R. NETSER. Retinal Anomalies in Schizophrenia and Their Clinical and Functional Significance.

Because the retina is part of the central nervous system, and develops from the same tissue as the brain, changes in retinal functioning often parallel changes in brain function. Alterations in retinal functioning in several neurological disorders, and in schizophrenia, have been observed using electroretinography (ERG). This presentation will describe ERG data from 25 schizophrenia patients under light- and dark-adapted conditions, and under conditions of varying light intensity, duration, and frequency, and compare the findings to those from major depressive disorder (n=25), Parkinson's disease (n=19), and psychiatrically healthy control groups (n=25). The multiple tests on which schizophrenia patients demonstrated significantly more abnormal performance relative to the other groups will be highlighted in an effort to understand their broader neurobiological implications. In addition, multiple relationships with negative symptoms in the schizophrenia group, but no relationships with depression in either psychiatric patient group will be discussed, to emphasize the potential for specificity in links to mechanisms of symptom formation. For schizophrenia patients, data on relationships between retinal function indices and visual evoked potentials, and performance on early- and mid-level visual processing tasks will be presented to clarify the functional significance of retinal anomalies in this disorder. The advantages of portable ERG testing and its potential benefit in clinical monitoring of patients and at-risk samples will also be discussed.

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M. GREEN, A. MCCLEERY, J. WYNN, C. JAHSHAN & D. MATHALON. Early Auditory Processing in Schizophrenia: Relationships to Clinical Symptoms and Cognitive Remediation.

People with schizophrenia have clear impairments in early auditory processing. Mismatch negativity (MMN) is an auditory event-related potential that has been studied extensively in schizophrenia. MMN is elicited when an unexpected, low probability deviant auditory stimulus is presented after a repeated train of standard stimuli. The roving standard MMN paradigm is a modified version of MMN in which a series of standards is presented followed by a deviant, as in typical MMN. However, the first appearance of the deviant stimulus is repeated over successive trials so it becomes the new standard. This type of MMN varies the number of times the standard is presented. The roving standard MMN is good for exploring prediction error signaling and can separate out its components (i.e., repetition positivity, deviant negativity).

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This presentation will cover three studies from our laboratory using traditional and roving standard MMN. In the first study using roving standard MMN we found that people with schizophrenia showed reduced MMNs due to reduced deviant negativity, but had normal repetition positivity. Hence, they could establish a memory trace, but had abnormal prediction error signaling. In the second study also using roving standard mismatch, we found that schizophrenia patients with auditory hallucinations (but not non-hallucinators) failed to show an increase in negativity as the number of standards increased, indicating abnormalities in prediction error signaling are associated with hallucinations. The third study was a randomized controlled trial of two types of cognitive remediation. We found that changes in typical (non-roving) MMN after 6 weeks of training predicted treatment effects on selected cognitive domains (e.g., verbal learning, reasoning / problem solving) after 12 weeks of training. Overall, these studies show the value of two versions of MMN for understanding clinical symptoms and treatment effects in schizophrenia.

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D. JAVITT, C. DONDÉ, A. MARTINEZ, J. KANTROWITZ, G. SILIPO, E. DIAS, C. CORCORAN, A. MEDALIA, A.M. SAPERSTEIN, B. VAIL & P. SEHATPOUR. Early Sensory Processing Deficits in Schizophrenia: Distribution and Consequences.

Deficits in early sensory processing, including both early auditory (EAP) and early visual impairments are key components of the neurocognitive deficits associated with schizophrenia (Sz). EAP deficits may be assessed behaviorally using a delayed tone matching task (TMT) and neurophysiologically using mismatch negativity (MMN), and contribute significantly to deficits in higher order functions including auditory emotion. These measures have increasingly been shown to differentiate subjects drawn from discrete treatment settings, and to extensively predict functional outcome status. In a large-scale study of 310 Sz patients vs. 210 healthy controls, EAP deficits were found to be bimodally distributed, with differential distribution across treatment settings. EAP-impaired and EAP-intact subjects showed similar demographics, with the exception of earlier termination of education among EAP-impaired subjects. EAP-impaired subjects also differed from EAP-intact subjects in both symptom profile, where they showed an excess of cognitive symptoms, and neuropsychological profile, where they showed differential reduction in processing speed, attention/vigilance and working memory. Auditory measures, moreover, clustered separately from traditional neuropsychological domains. In imaging studies, the two groups differed in functional connectivity between auditory thalamus (medial geniculate nucleus) and early auditory cortex, as well as within auditory cortical regions. Deficits in early visual processing may also be demonstrated using both behavioral (e.g. contrast/motion sensitivity) and neurophysiological (e.g. visual P1, N2m) measures. Deficits are observed not only in individuals with established schizophrenia, but also at clinical high risk. Overall, these findings support the importance of early sensory processing deficits to both the pathophysiological investigation and functional outcome of individuals with schizophrenia.

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A. MEDALIA, A.M. SAPERSTEIN, M. QIAN & D. JAVITT. Impact of Baseline Early Auditory Processing on Response to Cognitive Remediation for Schizophrenia.

Objective: Early auditory processing (EAP) is increasingly a focus of efforts to identify biomarkers of treatment response in schizophrenia. EAP deficits lead to poor functional outcome via impaired cognition, and treatments that successfully target EAP may drive downstream cognitive improvements. When cognitive remediation (CR) programs provide EAP training there is an opportunity to personalize treatment and optimize its impact by first assessing baseline need. This study examined the differential benefit of EAP training for those with and without baseline EAP deficits as defined by performance on the Tone Matching Test.

Participants and Methods: 103 outpatients aged 18-65, diagnosed with schizophrenia spectrum disorder, were first classified as having intact (48.5%) or impaired (51.5%) EAP and then randomized to a CR program with restorative exercise plans that either included EAP training (N=49) or did not (N=54). Cognitive and functional outcomes were measured post 30 sessions CR and 3 months later.

Results: EAP impaired (EAP-) participants were the only group to have moderate treatment effect sizes (0.46), and significant benefit from EAP training on verbal learning. Whereas both EAP- and EAP+ subgroups showed similar Number Needed to Treat (NNT) for functional outcome (1.3 and 1.5 respectively) the NNT for cognitive gain was less than half for the EAP- (2.4) compared to the EAP+ (6.0). Post CR, change in EAP had a significant effect on change in functional outcome ($\beta = 0.878$, $p<0.001$) and change in cognition ($\beta = 0.381$, $p=0.001$). Cognitive gains partially mediated the relationship between gains in EAP and functional capacity.

Conclusion: These findings support the importance of identifying and addressing basic auditory deficits when attempting to remediate higher order auditory impairments such as verbal learning. Routine assessment of EAP in CR participants is not currently done, but could be helpful for personalizing treatment.

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Symposium 4. Lesser Known Aspects and Unresolved Controversies Regarding Wernicke-Korsakoff Syndrome

Chair: Stephen C. Bowden

Presenters: Nicolaas Arts, Rosemary Fama, Roy P. Kessels, Simon J. Scalzo

11:45 a.m.–1:15 p.m.

S. BOWDEN, N. ARTS, R. FAMA, R.P. KESSELS, S.J. SCALZO & M. KOPELMAN. Lesser Known Aspects and Unresolved Controversies Regarding Wernicke-Korsakoff Syndrome.

A commonly encountered view is that little has changed regarding Wernicke-Korsakoff syndrome (WKS) for many years. However, recent decades have seen important changes in our understanding of WKS, although these advances are not well known. The most important advances involve the observation that the post mortem diagnosis of WKS is much more common than the clinical diagnosis suggests, that clinical presentation in acute and chronic WKS is very heterogeneous, that recovery is commonly observed, and that the clinical presentation of alcohol-related and non-alcohol-related WKS is similar. In this symposium, the current state of our knowledge regarding WKS will be reviewed and some of the outstanding controversies that impact on accurate diagnosis and effective treatment will be addressed. Dr. Arts will provide a review of current understanding of etiology, symptom spectrum, nosology, and anatomical localization, noting the shift in attention from ethanol neurotoxicity to thiamine deficiency. Dr. Fama will address the heterogeneity among individuals with alcohol use disorder who show current neurological signs and history of dietary deficiencies consistent with risk of preclinical Wernicke's encephalopathy. Dr. Kessels will elaborate on cognitive presentation in the chronic Korsakoff phase of WKS, reporting on broader aspects of cognition classified according to the Cattell-Horn-Carroll model, and aspects of executive function. Dr. Scalzo will present a case-series and systematic review of patients in the Korsakoff phase to evaluate the hypothesis that anterograde memory function is always worse than general intellectual function. Dr. Kopelman will act as Discussant. Together, the presentations in this symposium will illustrate that our understanding of WKS

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has evolved in important ways, and that clinicians should have a lower threshold for diagnosis of the variants of WKS in any patient with a history of alcohol use disorder or nutritional deficiency.
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N. ARTS, S.J. WALVOORT & R.P. KESSELS. Korsakoff's Syndrome: What We Still Don't Know.
Korsakoff's syndrome (KS) is caused by severe thiamine deficiency (TD). It may occur after Wernicke encephalopathy, predominantly in the context of alcohol abuse and malnutrition. It is characterized by severe amnesia, lack of insight, and confabulations. So far, neuropsychological studies have clarified many aspects of KS, but unresolved issues still remain. Here, we will address some major controversies and explore the possible routes to resolve them. Since long, the key controversy is about the role of alcohol in the etiology of KS, that is, does alcohol solely contribute to the development of KS by creating the context in which thiamine deficiency occurs, or does ethanol neurotoxicity (EN) play an essential role in the development of the neuropathology underlying KS, apart from thiamine depletion (continuity hypothesis)? A related controversy involves the symptomatology of KS. Are cognitive deficits in non-memory domains essential symptoms of KS or are they only encountered in alcoholic KS patients related to EN? A third controversy concerns the definition of KS. When the confusional phase of WE has disappeared after thiamine replacement many patients are left with memory problems. However, these problems may disappear in a matter of weeks in many patients. Should we label these memory problems as 'transient KS', as the convalescence phase of WE, or as alcoholic encephalopathy (AE)? A fourth controversy concerns the neuropathology underlying KS. Does KS only develop when the anterior thalamic nuclei are severely damaged, in addition to the mammillary bodies and the mediodorsal thalamic nuclei? Is it possible that severe damage to the anterior thalamic nuclei leads to KS, even in the absence of damage to the mammillary bodies and the mediodorsal thalamic nuclei? In our presentation, we argue that shifting scientific attention from EN to forms of TD that are less severe and are leading to less conspicuous symptoms or syndromes may resolve these controversies.
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R. FAMA, A. LE BERRE & E.V. SULLIVAN. Heterogeneity of Executive Function and Memory Performance Among Chronic Alcoholics Meeting Either the Dietary Deficiency or Ataxia Criterion in the Assessment of Preclinical Wernicke's Encephalopathy.
Objective: Neurological signs and nutritional deficiencies, assessed with Caine criteria (oculomotor disturbances, cerebellar dysfunction, altered mental state, dietary deficiency) to diagnose Wernicke's encephalopathy (WE), have been associated with severity of executive function (EF) and memory (MEM) deficits in chronic alcoholism. Although categorization by number of Caine criteria met has utility in identifying severity level of cognitive impairments among alcoholics, selectivity of deficits associated with specific Caine criterion could explain aspects of heterogeneity of alcoholism-related cognitive dysfunction. **Participants and Methods:** Participants, 86 nonamnesic alcoholics (ALC) and 37 controls (NC), completed tests of EF and MEM. Age- and education-corrected Z-scores were based on NC performance. ALC were first categorized by number of Caine criteria met: 21 met 0 criteria (Caine0), 39 met 1 criterion (Caine1), and 26 met at least 2 criteria (Caine2). Caine1 participants generally met either the dietary deficiency or cerebellar dysfunction criterion and were categorized as Caine-D (dietary) or Caine-A (ataxia) to examine whether these Caine1 subgroups differed in functional abilities. **Results:** Caine-A relative to Caine0 was impaired in EF (Z-scores -1.28 vs. -0.32) but not MEM (Z-scores -.54 vs -.67). Caine-D performed similarly to Caine0 on EF and MEM. MEM impairment was observed for only those meeting both ataxia and diet deficiency criteria (Caine2), and this subgroup had a lower thiamine level than Caine0. **Conclusions:** Caine1 who met the cerebellar criterion showed EF impairment, whereas those who met the dietary deficiency criterion did not. Dietary deficiency was associated with EF and MEM deficits but only when present with balance and gait deficits. Whether dietary deficiencies play a role in ataxia via cerebellar dysfunction or underlie the memory impairment in preclinical WE is not yet clear. Support: AA005965, AA010723, AA013521, AA017347
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R.P. KESSELS. Preserved Intelligence in Korsakoff's Syndrome? A Neuropsychological Perspective on Crystallized Intelligence, Fluid Reasoning and Executive Function.
Objective: Korsakoff's syndrome (KS) is defined as a disproportionate amnesia in comparison to other cognitive functions, due to chronic thiamine deficiency that is mostly observed in alcoholics. Intelligence has been long assumed to be spared in KS, with intellectual decline considered to be indicative of, for instance, alcohol-related dementia, but not KS. However, more recent studies have challenged this notion, arguing that fluid aspects of intelligence are clearly impaired, which can be related to executive function (EF). I will present recent evidence on the intelligence profile in KS, using the Cattell-Horn-Carroll theory (CHC) of cognitive abilities, and also focus on specific EF processes using the Myake framework.
Participants and Methods: In 34 KS patients, 40 non-KS alcoholics (ALC) and 40 psychiatric controls, we administered the WAIS-IV and NART to estimate the premorbid IQ. In an independent group of 36 KS patients and 30 healthy controls, we investigated executive function using experimental, process-pure computer paradigms measuring switching, inhibition and (complex) updating.
Results: The WAIS-IV Full-Scale IQ was lower than the estimated premorbid (NART) IQ in the KS and ALC groups. Perceptual Reasoning and Processing Speed were worse in the KS than in the ALC group, but Working Memory and Verbal Comprehension did not differ. With respect to EF, shifting and updating were affected in KS, but no deficits in inhibition were found.
Conclusions: While crystallized measures of intelligence may be relatively preserved in KS, fluid reasoning is clearly affected, which can be linked to impaired EF, notably switching and (complex) updating. The results will be interpreted using the CHC theory of intelligence, current theories of EF, and alcohol- and thiamine-related brain dysfunction.
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S.J. SCALZO & S. BOWDEN. Psychometric Heterogeneity of the Chronic Korsakoff Phase With or Without Alcohol: A Case-Series and Systematic Review.
Objective: Korsakoff's syndrome is the chronic phase of Wernicke-Korsakoff syndrome (WKS). The neuropsychological component of chronic WKS is conventionally defined as severe, selective memory impairment with relatively preserved general intellectual function. Due to the typical combination of WKS and alcohol use disorders, ethanol neurotoxicity is often thought to contribute to cognitive changes. The objective of the present study was to evaluate the conventional definition of chronic WKS in patients with or without an alcohol use disorder. **Participants and Methods:** WKS in association with an alcohol use disorder was examined in a case-series of nine patients at an Australian public hospital. WKS in the absence of alcohol use disorders was examined via systematic review of the literature. **Results:** In the case-series of WKS patients with an alcohol use disorder, anterograde memory ability (Delayed Memory Index) was not consistently more impaired than general intellectual function (Full-Scale IQ). Diagnostic sensitivity of the 'hallmark' criterion for chronic WKS of anterograde memory score at least 20 points

less than intelligence score was only 50%. Likewise, in the systematic review of WKS unrelated to alcohol, impaired general intellectual function was frequently described by respective case authors, in addition to memory impairments. Severity of deficits was variable in both alcohol and non-alcohol related WKS. **Conclusions:** The conventional notion of chronic-phase WKS as a disorder of severe, selective memory impairment with relatively preserved general intelligence has poor sensitivity. Use of this criterion will result in many cases of chronic WKS being missed. Instead, multiple cognitive abilities may be reduced in chronic WKS. This neuropsychological heterogeneity in WKS was identified in patients with or without a history of an alcohol use disorder.
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Symposium 5. Impact of Physical Exercise on Cognition Across the Life-Span

Chair and Presenter: David Predovan

Presenters: Jennifer Heisz, Laura Middleton, Louis Bherer, John Best

11:45 a.m.–1:15 p.m.

D. PREDOVAN, J. HEISZ, L. MIDDLETON, L. BHERER & T. LIU-AMBROSE. Impact of Physical Exercise on Cognition Across the Life-Span.
A growing body of research has highlighted the long-term benefits of being physically active throughout life, particularly with regard to the cognitive decline associated with aging. However, more insights are needed to determine 1) the mechanisms by which physical activity interacts with brain health, 2) the nature of the affected cognitive domain and 3) how age moderated these effects. A compelling experimental design to examine these questions is the assessment of a physical exercise program. The symposium will examine the impact of physical exercise on cognition across the life-span (from ages 17 to 74). Dr. Jennifer J. Heisz will talk about the combined effect of physical exercise and cognitive training (versus physical exercise training only) on memory and neurotrophic factors (BDNF and IGF-1) in a group of younger adults. Dr. Laura Middleton will report results of a study assessing the changes in cognition (cognitive control) and mood across a series of six moderate intensity aerobic exercise sessions in a healthy young adults' sample. I will present a randomized controlled trial (n=132) examining the efficacy of an aerobic training program over a 6-month period on cognitive function in cognitively healthy adults aged 20 to 67 (with additional analysis related to APOE ε4 status, sex-related differences, cortical thickness and tractography). Dr. Louis Bherer will discuss about the impact of an aerobic training program over a 3-month period on cardiorespiratory fitness and dual-task performances in a healthy older adults' sample (n = 143). Lastly, Dr. Teresa Liu-Ambrose will share the results of a randomized controlled trial examining the effect of a progressive exercise training program (6-month) on cognitive and neural function in older adults with mild sub-cortical ischaemic vascular cognitive impairment (n=70).
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D. PREDOVAN, R. SLOAN & Y. STERN. Effect of Physical Exercise on Cognition in Healthy Adults Aged 20-67.
Objective: The vast majority of studies published to date on exercise and cognitive decline have been confined to a population aged 65 and over. However, earlier intervention may be beneficial for the prevention of cognitive decline associated with aging. A randomized, parallel-group, observer-masked, community-based clinical trial was designed to examine the beneficial impact of an aerobic exercise program on cognitive function in a healthy adults' population aged 20-67.
Participants and Methods: One hundred thirty-two cognitively normal individuals with below cardiorespiratory fitness were randomly assigned to either an aerobic exercise program or a stretching/toning program. The respective program had a duration of 6-months with a session frequency of four-times-one-hour weekly. Participants underwent VO_2 max test to measure cardiorespiratory fitness. Cognitive performance was assessed across multiple domain (executive function, episodic memory, processing speed, language, and attention). Body mass index (BMI), cortical thickness, ApoE 4 status were also assessed.
Results: A significant increase in cardiorespiratory fitness and decrease in BMI were measured in the aerobic exercise program but not in the stretching/toning program. Executive function improved significantly in the aerobic exercise program. This effect was moderated by age. In the aerobic exercise program, cortical thickness increased significantly in a left frontal region. Lastly, after controlling for age and baseline performance, individuals with at least one APOE ε4 allele in the aerobic exercise program showed less improvement in executive function.
Conclusions: This study demonstrates the efficacy of aerobic exercise for cognition in adults age 20 – 67. The effect of aerobic exercise on executive function was more important as age increased, suggesting that it may mitigate age-related declines.
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J. HEISZ, I. CLARK, K. BONIN, E. PAOLUCCI, B. MICHALSKI, S. BECKER & M. FAHNESTOCK. The Effects of a Combined Physical Exercise and Cognitive Training on Memory, Brain-Derived Neurotrophic Factor and Insulin-Like Growth Factor 1.
The effect of a physical exercise training and a combined physical exercise and cognitive training on memory and neurotrophic factors was assessed in a group of 95 healthy young participants. Participants were assigned to either six weeks of physical exercise training, combined physical exercise and cognitive training, or no training (control). Improvement in performance on a high-interference memory task, linked to hippocampal function, was only observed for the physical exercise training and the combined training groups. No benefit was measured for a general recognition performance. This result could be interpreted as an evidence that the physical exercise training selectively increases high-interference memory. Also, greater increases in the serum neurotrophic factors brain-derived neurotrophic factor (BDNF) and insulin-like growth factor 1 (IGF-1) was observed among participants that have shown greater fitness improvements from the physical exercise training. Further analysis reveals that the high responders to physical exercise in the combined physical exercise and cognitive training group also had better high-interference memory performance compared to the high responders in the physical exercise training group, suggesting that potential synergistic effects might depend on the availability of neurotrophic factors.
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L. MIDDLETON, T. NIEMAN, J. CLANCY, T. GIALLONARDO, M. BERGELT & C. ELLIS. Changes in Cognition and Mood Across Repeated Exercise Sessions.
Objective: Cognitive control improves after a single exercise session and after a period of exercise training. However, the consistency and accumulation of acute cognitive changes across a series of exercise sessions is not understood. The objectives of this study were to: 1) examine changes in cognition and mood after moderate intensity aerobic exercise; 2) compare the changes in cognition and mood across a series of sessions.

Participants and Methods: Ten young healthy adults (mean age: 21.9 [SD=1.7]; 60% female) completed 20min of moderate intensity exercise 3x/week over 2 weeks (6 sessions total). Cognitive control was assessed using a modified Flanker task before and 10min after each exercise session. Mood was reported using the Bond Lader Visual Analogue Scale 5x/day on exercise and non-exercise days (before exercise/8:30am, after exercise/9:30am, 11:30am, 3pm, 8pm). Outcomes were analyzed using mixed linear regression models.
Results: For Flanker response time, there were main effects for session number ($f_{5,63.4}$=3.26, p=0.01) and time ($f_{1,178.2}$=5.37, p=0.02), but no interaction between the two ($f_{5,63.4}$=0.13, p=0.98). Flanker response times were consistently faster after exercise than before and grew faster across repeated sessions. Flanker accuracy did not differ by session number or time. Mood fluctuated over the day ($f_{4,156.0}$=4.92, p=0.001) with lows at 8:30am and 3pm but did not differ between exercise and non-exercise days ($f_{1,445.6}$=0.005, p=0.94).
Conclusions: These results suggest that Flanker performance improves consistently after moderate intensity aerobic exercise, and that the level of performance improves across 6 assessments in 2 weeks. Future research will include a control group to isolate exercise from learning effects. At minimum, acute changes in cognitive control after aerobic exercise appear to be consistent across sessions, with the possibility of positive, cumulative effects.
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L. BHERER, A. LANGEARD, N. KAUSHAL & T. VRINCEANU. Cardiorespiratory Fitness Differently Mediates Physical Training Related Improvement in Dual-Task Performances in Younger-Old and Older-Old Adults.
It has often been reported that dual-task performances decline with age. Studies suggest that physical exercise intervention can help improve cognitive performance in older adults but this improvement seems to be specific of certain cognitive functions and of certain age groups. Whether physical exercise can improve dual-task performances is not clear. Moreover, the mechanisms supporting this cognitive enhancement effect remain to be elucidated. The present study investigated the impacts of physical training on dual-task performances in sedentary but healthy younger-old and older-old adults. The study also aimed to assess whether physical training effect on cognition was mediated by improvement in cardiorespiratory fitness. One hundred forty-three participants age 65 years and over took part in an aerobic training program over a 3-month period or were assigned to an inactive control group. All participants underwent a dual-task paradigm and an indirect measure of cardiorespiratory fitness. Multivariate regression models were used to test the effect of aerobic training on cardiorespiratory fitness and dual-task outcomes. Mediation analysis was used to determine if the aerobic training related cognitive changes were mediated by cardiorespiratory fitness improvements. In participants younger than 70 years of age, task-set cost, and index of dual-task performance, improved after physical training but this improvement was not mediated by cardiorespiratory fitness. In participants aged 70 years and over, only the processing speed was improved after the aerobic training program and this effect was fully mediated by change in cardiorespiratory fitness. Results of the present study suggest that physical exercise intervention can help improve performance in dual-task in older adults.
Correspondence: *Louis Bherer. E-mail: louis.bherer@umontreal.ca*

T. LIU-AMBROSE, J. BEST, C. BARHA, L. HSU, J. DAVIS, J. ENG & G. HSIUNG. Aerobic Exercise Promotes Cognitive and Neural Outcomes in Adults With Mild Vascular Cognitive Impairment.
Objective: To assess the efficacy of a progressive aerobic exercise training program on cognitive and neural function in adults with mild Sub-cortical Ischaemic Vascular Cognitive Impairment (SIVCI).
Participants and Methods: A proof-of-concept single-blinded randomized controlled trial comparing a 6-month, thrice-weekly, progressive aerobic exercise training program with usual care plus education on cognitive and neural function in adults with mild SIVCI. A subset of participants also completed functional MRI (fMRI) at baseline and intervention completion. A modified flanker task was performed during the fMRI session.
Results: 70 adults randomized to aerobic exercise training (AT) or usual care (CON) were included in intention-to-treat analyses (mean age of 74 years, 51% female). At intervention completion, the AT group significantly improved ADAS-Cog performance compared with the CON group (-1.71 point difference, 95% CI: -3.15, -0.26). Examination of secondary measures showed between-group differences at intervention completion favoring the AT group in six-minute walk distance (30.35 meter difference, 95% CI: 5.82, 54.86) and in diastolic blood pressure (-6.89 mmHg difference, 95% CI: -12.52, -1.26). Among the participants who completed MRI, those in the AT group significantly improved flanker task reaction time. Moreover, compared with the CON group, the AT group demonstrated reduced activation in the left lateral occipital cortex and right superior temporal gyrus. Reduced activity in these brain regions was significantly associated with improved flanker task performance at intervention completion.
Conclusions: This study provides preliminary evidence for the efficacy of six months of thrice-weekly progressive aerobic training in community-dwelling adults with mild SIVCI, relative to usual care plus education.
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THURSDAY AFTERNOON, FEBRUARY 21, 2019

Poster Session 4. Adult Medical

12:00–1:15 p.m.

Anoxia/Hypoxia

S. RASKIN, O. DEJOIE & A. LEE. Neuropsychological functioning in women survivors of domestic violence.
Objective: Domestic violence (DV) often includes blows to the head and strangulation. As a result, traumatic brain injury (TBI) can be a result of DV. Individuals who have experienced TBI may present with a variety of symptoms, such as impaired memory, attention, difficulty sleeping, and emotional instability. This study was designed to answer four questions: 1) what percent of DV survivors screen positively for TBI? 2) do healthy participants perform better than DV survivors on cognitive measures? 3) do measures of depression, anxiety, and quality of life differ between the two groups? 4) is post-traumatic stress disorder (PTSD) experienced at a higher rate in DV survivors than healthy participants?
Participants and Methods: A battery of cognitive, mood, quality of life, and PTSD measures was administered to 52 participants (28 DV survivors and 24 healthy non-DV participants). Women with DV were a mean age of 37.60 years (sd 13.27) of age with 14.44 (sd 1.70) years of education and the non-DV adults were 31.06 years of age (sd 12.54) with 16.00 years (sd 2.36) of education. Assessments were divided into six categories: verbal fluency, memory, mood/life quality, attention, executive function, and PTSD and consisted of standard neuropsychological measures. Participants were administered the HELPS to determine history of brain injury.

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Results: Fifty-seven percent of DV survivors screened positively for TBI, and commonly reported symptoms including fatigue and headaches. Scores on measures of depression, chronic stress, and environmental quality of life were significantly higher in DV survivors than non-DV participants. Verbal fluency, delayed recall, and environmental quality of life were significantly lower in DV survivors than non-DV participants.
Conclusions: This study highlights the risks of TBI from DV, as well as the cognitive and mood differences between DV survivors and age-matched participants.
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A. STABLER. Neuropsychological Impairment from Anoxic Injury in the Setting of Perioperative Cardiac Arrest due to Hypovolemic Shock: A Case Study.
Objective: Numerous studies have documented the cognitive sequelae of anoxic brain injury due to out-of-hospital cardiac arrest, typically in the context of coronary artery disease or myocardial infarction. The current case report presents the neuropsychological findings of a less common anoxic brain injury sustained during an episode of in-hospital, perioperative cardiac arrest due to hypovolemic shock.
Participants and Methods: The patient is an otherwise healthy 53-year-old, right-handed, married female with 14 years of education. She underwent a routine hysterectomy four months prior to testing that was complicated by peri-operative hypovolemic shock leading to cardiac arrest. She was resuscitated for approximately five minutes during the arrest and was intubated and placed on a ventilator after surgery. She was alert and oriented the following day and discharged home eight days post-surgery. Approximately one to two months post-surgery, she and her husband noticed difficulties with memory and word-finding, and she was subsequently referred for a neuropsychological evaluation.
Results: The patient's neuropsychological performance revealed mild to moderately impaired encoding and retrieval of verbal/visual information characterized by lack of organized learning approach and source memory recall errors. She also displayed mild impairments in verbal fluency and confrontation naming suggestive of word-finding difficulty.
Conclusions: These findings align with studies of out-of-hospital cardiac arrest due to CAD or MI, suggesting cardiac arrest due to hypovolemic shock can lead to anoxic brain injury and subsequent impairments in memory and word-finding. This consistency suggests the mechanism by which cardiac arrest occurs may have little impact on neurocognitive outcome. Despite receiving immediate treatment for her arrest, the patient's neurocognitive outcome was similar to that of patients with out-of-hospital arrest whose time to treatment is more delayed.
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Concussion/Mild TBI (Adult)

S. KIM, G. BERENJI, N. LEE, B.J. MARTIN, J. SUH, P. DOMIGAN, D. WALTERS & A. TJOA. Neuropsychological Presentation of PTSD and Blast-Induced mTBI among Iraq and Afghanistan Veterans.
Objective: We administered neuropsychological tests and self-reported measures of cognitive and emotional functioning to 138 Veterans to explore the neuropsychological presentations of PTSD and Blast-induced mTBI. We hypothesized that psychological features of PTSD and mTBI among Veterans are different from a group of normal controls.
Participants and Methods: Three groups of Operation Enduring Freedom/Operation Iraqi Freedom Veterans participated: 1) normal controls (n = 43), 2) PTSD only (n = 48), and 3) comorbid PTSD and Blast-induced mTBI (n = 47). These Veterans completed tests of verbal and nonverbal memory, processing speed, working memory, motor control, and executive functioning as well as cognitive and emotional functioning. Instead of comparing these groups directly on these 40 test scores, we used exploratory factor analysis (EFA) to extract factor scores, which then were compared.
Results: The EFA supported an 8-factor model. MANOVA of the three groups on the eight factor scores demonstrated three significant factor mean differences on: 1) Perceived Cognitive Complications (PCC), 2) Perceived Emotional Distress (PED), and 3) Processing Speed (PS), but no significant differences on the other factors of verbal and nonverbal memory, motor control, and verbal fluency switching. Post-hoc analyses showed no significant mean difference in PS between the PTSD only and the comorbid PTSD and mTBI groups, but differences were found between the control group and the two clinical groups.
Conclusions: The current study supports general findings of the literature on Veterans' PTSD and mTBI. However, Veterans' self-reported complaints of cognitive functioning (e.g., memory, language, and executive functioning) were not associated with neuropsychological test performance except for processing speed. This implies that future, primary interventions for those Veterans focus on processing speed to ease emotional and neuropsychological complications.
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Infectious Disease/Encephalitis/Meningitis (including HIV/AIDS)

K. ALVAREZ, M. AGHVINIAN, M. GAVILANES, L. MOSSMAN & A. ARENTOFT. Lifetime and recent alcohol use is associated with learning, memory, and working memory performance in HIV+ individuals.
Objective: Up to 50% of HIV+ adults have a history of heavy alcohol use (NIH, 2010). HIV+ individuals with chronic alcohol use are at greater risk of poorer clinical outcomes (Rosenbloom et al., 2010) and neuropsychological deficits (Fama et al., 2009). This study explores how heavy alcohol use influences neuropsychological functioning, particularly memory, in HIV+ individuals.
Participants and Methods: 45 HIV+ adults (87% male; 47% Caucasian, 31% African American; 4% Alaskan Native, 2% Asian American, 16% Other; 71% non-Hispanic; age=44.38 ±9.56; education=13.32 ±2.38) completed a comprehensive neuropsychological battery, neuromedical and psychiatric interview, including the Structured Clinical Interview for DSM-5 (SCID) and the Kreek- McHugh-Schulger-Kellogg scale (KMSK), a measure of recent and lifetime substance use.
Results: Recent alcohol consumption was significantly associated with WAIS-IV Digit Span (r=.26, p=.02), BVMT-Learning (p=-.44, p=<.01), PASAT (p=.30, p=.05), CVLT-II Serial Clustering (r=.37, p=.02), and CVLT-II Long Delay Retention (r=-.48, p=<.01). Lifetime alcohol exposure was significantly associated with WAIS-IV Digit Span (r=.31, p=.04), COWAT-FAS (r=.32, p=.03), CVLT-II Serial Clustering (r=.38, p= .01), and CVLT-II Long Delay Retention (r=-.44, p= <.01). Using the SCID DSM-V criteria, significant group differences were found on CVLT-II Subjective Clustering (t= -2.03, p=.05) and CVLT-II Long-Delay Retention (t= 2.03, p= .05).
Conclusions: Both recent and lifetime alcohol exposure was significantly associated with neuropsychological performance, particularly learning and memory performance. These findings align with previous studies, which found that HIV+ individuals who reported recent alcohol use demonstrated greater impairment on measures of verbal memory and conditional reaction time (Horner et al., 1999), and that heavy alcohol use affected working memory and executive function (Rothlind et al., 2005).
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C.L. CROOK, E.P. MORRIS, A.C. SUMMERS, V. GUZMAN, K. TURESON, M.J. SAVIN, D.A. BYRD & M.G. RIVERA MINDT. The Effects of Current and Past Cannabis Use on Cognitive Functioning in PLWH.

Objective: People living with HIV (PLWH) report higher rates of cannabis use than the general population. In light of recent policy shifts, legally sourced medicinal cannabis use is particularly common in this group. It is therefore important to better understand cannabis-associated effects on cognition, especially as PLWH are at a heightened risk for neurocognitive impairment. Prior research is limited & marked by equivocal findings. This study aimed to examine the effects of current & past cannabis use on cognitive functioning in PLWH.

Participants and Methods: This cross-sectional study included 152 PLWH (age *M(SD)*=47.16(8.35); education *M(SD)*=12.65(2.82); 72% Male; 72% Latinx) who underwent neuropsychological, DSM-diagnostic & urine toxicology evaluations. One-way ANCOVA's (Covariate: WRAT Reading Subtest) were conducted to examine the effect of current cannabis use disorder (CUD) diagnosis, past CUD diagnosis & urine toxicology (respectively) on demographically-corrected average T-scores for global & domain-specific cognitive functioning (attention/working memory, learning, memory, executive function, fluency, processing speed & motor).

Results: The current CUD+ group performed significantly worse on executive functioning compared to the CUD- group, $F(2,127)=5.48$, $p=.02$. There was a trend level effect of current CUD+ on global cognition, $F(2,128)=2.68$, $p=.10$. Current CUD+ was not related to other domains (all *ps*>.10). The past CUD+ group performed better on processing speed, $F(2,128)=3.93$, $p=.05$, & motor, $F(2,130)=2.85$, $p=.09$, compared to the CUD- group at trend level. Past CUD+ was not related to global/other domains (all *ps*>.10). Positive toxicology for cannabis was not related to cognition (all *ps*>.10).

Conclusions: Results indicate that current but not past cannabis use is linked to poorer executive functioning & global cognition in PLWH. Findings also suggest that cannabis associated cognitive effects may resolve after abstinence. Future research should determine if these associations are moderated by parameters of use.

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R. HICKSON, H. GOUSE, C. MELLINS, R. REMIEN, J. JOSKA, M. HENRY & R.N. ROBBINS. Neurocognition and Antiretroviral Therapy Adherence Among South Africans Living with HIV.

Objective: HIV-associated neurocognitive impairment (NCI) is prevalent among people living with HIV (PLWH). Evidence suggests that early antiretroviral therapy (ART) initiation can reduce the occurrence and/or severity of NCI. For ART to be optimally effective a high level of adherence is required. Electronic Monitoring Devices (EMD) are considered objective measures of ART adherence, but few studies have examined associations between neuropsychological (NP) functioning and EMD-based ART adherence measures in South Africa, which has the world's largest population of PLWH. This study examined relationships between EMD measured ART adherence and NP functioning among HIV+ South Africans after their first year on ART.

Participants and Methods: Forty-nine HIV+ Black South African adults were administered a NP test battery after 12 months of continuous ART adherence monitoring by EMD. Pearson correlation coefficients were computed between the number of months with Wisepill adherence >80% and each NP test in the battery.

Results: Participants were 34 years old (*SD*=6.7 years), and 84% female. Mean adherence for the 49 participants was 86% (*SD*=11%). The number of months with adherence over 80% was significantly positively correlated with Hopkins Verbal Learning Test-Revised Total (trials 1-3), $r(49)=.303$, $p=.035$, Brief Visuospatial Memory Test Delayed, $r(49)=.319$, $p=.026$, and WAIS-III Symbol Search, $r(49)=.339$, $p=.017$.

Conclusions: These findings provide preliminary evidence that ART non-adherence may be related to worse NP functioning one year after initiating ART in the domains of processing speed, verbal learning and visual memory among PLWH in South Africa. However, given the small sample size and number of NP tests, future research needs to replicate these findings in a larger sample with greater power to detect associations and control for multiple comparisons.

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J.E. IUDICELLO, E.E. MORGAN, D.R. COOKSON, M. POTTER, R.J. ELLIS, R. HEATON, I. GRANT & S. LETENDRE. Plasma vascular cellular adhesion molecule-1 (VCAM-1) levels are elevated in HIV disease and methamphetamine dependence and associated with neurocognitive impairment.

Objective: Methamphetamine (METH) use and HIV disease commonly co-occur and both can lead to adverse effects on the central nervous system, including neurovascular injury and neurocognitive impairment (NCI). However, the link between neurovascular injury and NCI is not well characterized in this population. This study sought to determine whether plasma vascular cellular adhesion molecule-1 (VCAM-1), a biomarker of endothelial dysfunction linked to cardiovascular disease, would be elevated and associated with NCI among individuals with METH dependence and/or HIV disease.

Participants and Methods: Participants included 230 individuals classified by METH dependence diagnoses (M+/M-) and HIV serostatus (H+/H-) into four groups: M-H- (n=75), M+H- (n=63), M-H+ (n=50), and M+H+ (n=43). Plasma VCAM-1 was measured by immunoassay and all participants completed a comprehensive neurocognitive evaluation. All H+ individuals were on suppressive antiretroviral therapy.

Results: Regression models predicting plasma VCAM-1 levels revealed significant independent main effects of METH ($p=0.024$) and HIV ($p=0.006$), even after accounting for relevant demographic and vascular risk (e.g., hypertension) factors. Plasma VCAM-1 levels were highest in the M+H+ group (Cohen's d relative to the M-H- group=0.79; $p<0.001$), followed by the M-H+ and M+H- groups (Cohen's ds relative to the M-H- group=0.47 and 0.38; *ps*=0.015 and 0.118). Within the whole sample, VCAM-1 levels were significantly associated with poorer executive functioning, speeded information processing, and motor abilities (*ps*<0.05).

Conclusions: METH and HIV confer significant risk for vascular injury, which may play an important role in the incidence and persistence of NCI. Understanding the vascular processes underlying METH- and HIV-associated NCI is critical for the development of effective detection, prevention, and treatment approaches for NCI in these increasingly prevalent risk groups.

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N. KABUBA. Adult neuropsychological testing in Zambia's HIV positive population on combined antiretroviral therapy.

Objective: To determine how well these tests would apply to the Zambian situation and to assess the cognitive functioning of the HIV+ population in Zambia.

Participants and Methods: A cross-sectional study in which 286 HIV positive Zambian participants and 324 HIV negative Zambian controls were assessed on a range of Western developed neuropsychological tests. Participants were evaluated for gender, age and education effects.

Results: The Western developed neuropsychological tests are appropriate for use in Zambia.

Having AIDS and high levels of HIV in the blood were associated with poor cognitive functioning.

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Female HIV+ participants in Zambia had more HIV related cognitive difficulties than the male HIV+ participants.
Younger less educated Zambian HIV+ participants appeared to experience more cognitive difficulties compared to the younger more educated Zambian HIV+ participants.
Conclusions: The results obtained illustrate the risk of HIV and AIDS infection in relation to cognitive functioning in Zambia and also provide an important step towards improving the quality of life of people living with HIV in Zambia.
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R. KUNDU, R. HEGDE & U. CLARK. Synergistic Effects of High Early-Life Stress Exposure and HIV Infection on Reaction Time Intra-Individual Variability.
Objective: A recent report indicated that HIV+ adults with high levels of early-life stress (ELS) exposure, relative to those with low ELS, exhibit greater reaction time intra-individual variability (RT-IIV), a neurobehavioral marker of cognitive dysfunction. Yet, comparisons to HIV-negative samples are lacking. It thus remains unclear whether increases in RT-IIV observed in HIV+ High-ELS adults reflect effects associated with high ELS exposure exclusively or the combined effects of high ELS and HIV. Gaining clarity on this issue is required to better characterize ELS-related risks to cognitive dysfunction in HIV+ samples.
Participants and Methods: We examined RT-IIV, assessed during a simple working memory task (1-back), in a sample of 60 HIV+ adults (34 High-ELS) and 70 HIV-negative control (HC) adults (33 High-ELS). ELS exposure was quantified using a standardized self-report questionnaire.
Results: We observed a significant interaction between HIV and ELS status ($F=4.40$, $p=.038$), driven by RT-IIV elevations in the HIV+ High-ELS group relative to all other groups, including HIV+ Low-ELS ($p=.019$), HC Low-ELS ($p=.070$), and HC High-ELS ($p=.013$). In the HIV+ sample, degree of ELS exposure was significantly associated with RT-IIV ($\beta=.288$, $p=.030$). By contrast, significant associations between ELS and RT-IIV were not observed in HC ($\beta=.003$, $p=.978$).
Conclusions: We find evidence for synergistic effects of HIV and high ELS on RT-IIV, suggesting ELS-related mechanisms exacerbate HIV-related neural vulnerabilities leading to increased cognitive dysfunction. Such findings provide further evidence that high ELS exposure is a significant risk factor for cognitive dysfunction, particularly in the context of HIV.
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A. LE BERRE, R. FAMA, S.A. SASSOON, A. PFEFFERBAUM, E.V. SULLIVAN & N.M. ZAHR. Cognitive and Motor Impairment Severity Related to Signs of Subclinical Wernicke's Encephalopathy in HIV Infection.
Objective: Wernicke's encephalopathy (WE), an acute neurological condition resulting from severe thiamine deficiency, is associated with alcoholism. Non-alcoholic WE has been described in individuals with Human Immunodeficiency Virus (HIV) infection but may be underdiagnosed. Based on a rating scheme by Caine *et al*, alcoholics were categorized by WE risk factors (dietary deficiency, oculomotor abnormality, cerebellar dysfunction, and altered mental state), and their cognitive performance was graded accordingly: those meeting multiple criteria (Caine2+) performed the worst on all functional domains, those meeting one criterion (Caine1) showed less impairment, and those meeting no criteria (Caine0) performed at control levels. The current study questioned whether presence of subclinical WE signs also underlies cognitive and motor deficits in individuals with HIV infection.
Participants and Methods: Accordingly, 56 individuals with HIV and 72 controls were assessed on 6 functional domains: attention and working memory, production, immediate and delayed episodic memory, visuospatial abilities, and upper limb motor function. Performance was expressed as age- and education-corrected Z-scores standardized on controls. Sorting by Caine criteria yielded 20 HIV as Caine0, 22 as Caine1, and 14 as Caine2+.
Results: Comparison among HIV Caine subgroups revealed a graded effect: Caine0 performed at control levels, Caine1 showed mild to moderate deficits on some of the functional domains, and Caine2+ showed the most severe deficits on each domain.
Conclusions: This graded severity pattern of performance among Caine subgroups suggests that signs of subclinical WE can partly explain the heterogeneity in pattern and severity of HIV-related cognitive and motor impairment. This study highlights the utility of Caine criteria in the identification of HIV individuals at risk of subclinical WE associated with more severe neurocognitive disorders, with implications for disease management. Support: AA017168, AA017923, AA010723, AA017437
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P.M. LOGAN & A.J. DONNELL. Long-Term Outcome Following a Rare Protracted Case of Anti-NMDA Receptor Encephalitis.
Objective: Anti-NDMA receptor encephalitis is an acute onset autoimmune disorder associated with significant neurological, psychiatric, and neurocognitive symptoms. Reports of long-term neuropsychological outcome have been limited; much of the literature indicates that while isolated cognitive weaknesses can persist, many patients return to near-baseline levels of functioning. We present the neuropsychological data of a young woman 8 years after disease onset.
Participants and Methods: Patient was a 26-year old, Caucasian female with 11 years of education and average premorbid intellectual abilities. Acute disease symptoms began at age 18, and included severe headache and fatigue, which worsened over a month to include severe psychiatric and neurological symptoms. While hospitalized, she became comatose, and developed respiratory failure. MRI indicated mild cerebral atrophy; PET and EEG were consistent with diffuse encephalitis, but no etiology was identified until 1 year later while in a rehabilitation facility. Despite receiving standard treatment, cognitive improvements were inconsistent. She has recovered some functional abilities, but remains well below premorbid abilities and requires assistance with all IADLs.
Results: Impairment was observed across the majority of domains tested. Standardized measure of global intellectual abilities was extremely low. Impairments were noted in perceptual reasoning, attention, working memory, processing speed, executive functions, fine motor control, and language. Visuospatial and unstructured verbal learning and memory were impaired; memory for organized verbal information was slightly better, but below expectations.
Conclusions: Profound global neuropsychological impairment persisted several years after disease onset; objective data was consistent with her mother's reports of significant executive dysfunction. The present findings suggest that anti-NMDAr encephalitis, particularly when treatment is delayed, can impact neurocognitive functioning worse than previously reported.
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E.C. MCINTOSH, R.A. NUNEZ, A. HAMMOND, S. PEDRAHITA, D. NGUYEN & A.D. THAMES. Differential Relationships Between Cerebrovascular Risk and Cognition Among Older HIV-Infected European Americans and African Americans.
Objective: HIV infection is associated with vascular comorbidities that negatively affect cognition. HIV and cerebrovascular (CV) risk factors are more prevalent in African Americans. The purpose of this study was to examine rates of CV risk among African Americans and European Americans with and without HIV, and to explore interaction effects of HIV status, race, and CV risk on cognition.

Participants and Methods: All participants (N=241) underwent neuropsychological testing, clinical examination, and medical history review (mean age = 52.5, 59.3% HIV-positive (HIV+), 61.0% African American). Z-scores were used to calculate domain-specific cognitive scores. CV risk score was calculated using medical history and current medications. Participants classified as high CV risk had 2+ medical risk factors. Logistic regression was used to examine rates of CV risk among HIV and racial groups, and to investigate the interaction between HIV status and race. Linear regression was used to examine relationships between CV risk and cognition, and interactions between HIV status, race, and CV risk.
Results: Logistic regression showed an interaction between HIV status and race on CV risk. HIV+ European Americans had significantly greater CV risk than European American controls, whereas rates of CV risk did not differ between HIV+ African Americans and African American controls (p=0.032). There were HIV status by race by CV risk interactions on verbal fluency, learning, and global cognition domains (p's<0.05).
Conclusions: The present study indicates racial differences in CV risk as a function of HIV status, such that HIV+ European Americans had greater CV risk than European American controls, whereas HIV infection was not associated with higher rates of CV risk in African Americans. Interactions between HIV status, race, and CV risk point to differential relationships between CV risk and cognition depending on race and HIV status. Further research is needed to understand what drives these differential relationships.
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E.P. MORRIS, D.A. BYRD, K. TURESON, C.L. CROOK, A.C. SUMMERS, V. GUZMAN & M.G. RIVERA MINDT. Somatic and Performance Symptoms of Depression Predict HIV-Associated Neurocognitive Disorder Severity in Latinx People Living with HIV.
Objective: A critical aspect of the Frascati diagnostic criteria for HIV-associated Neurocognitive Disorder (HAND; Antinori et al., 2007) is ruling out major depressive disorder. However, depression is common in people living with HIV (PLWH) and may affect neurocognitive (NC) function. HAND diagnostic criteria are not as well understood in those disparately affected by HIV, e.g., Latinx PLWH. Latinx adults report depressive symptoms differently than non-Hispanic white (NHW) adults, more often reporting somatic/performance symptoms, while NHW adults more often report cognitive/affective symptoms. This study examined how somatic/performance symptoms of depression, in comparison to cognitive/affective symptoms, contribute to HAND severity in a diverse sample.
Participants and Methods: This cross-sectional study included 140 PLWH (71% Latinx & 29% NHW; 71% Male; *M* Age=47.3±8.4 years; *M* Education=12.7±2.9 years) who completed an NC battery, Wechsler Test of Adult Reading (WTAR), and Beck Depression Inventory-II (BDI-II). HAND presence and level of severity were established using Frascati criteria & demographically-corrected NC T-scores. BDI-II domain scores were computed using published criteria for the Cognitive/Affective score (BDI-CA), and Somatic/Performance scores (BDI-SP; physical & functional items) were also computed.
Results: A linear regression revealed that our model (WTAR, BDI-SP, & BDI-CA) predicted HAND severity in the Latinx group (R^2=0.21, p<0.01), such that greater BDI-SP scores predicted more severe HAND diagnosis (β=.037, p<.05). The WTAR was also significant (p<.01), but BDI-CA did not contribute to the model (p=0.70). In contrast, this model did not predict HAND in the NHW group (R^2=0.10, p=.26).
Conclusions: Somatic/performance symptoms of depression appear to be a significant predictor of HAND diagnosis severity in Latinx PLWH, but not NHW PLWH. This finding points to the need for comprehensive and culturally-tailored approaches to HAND diagnosis in Latinx PLWH that adequately account for depressive symptoms.
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S. NICHOLS, V. FIGUEROA, A. CHEN, J. JACOBUS, T. WOLFSON & C. FENNEMA-NOTESTINE. The Impact of HIV on Verbal Learning and Memory in Young Adults May Be Altered in the Context of Cannabis Use.
Objective: HIV infection leads to chronic immune activation and inflammation, which can persist despite early antiretroviral therapy and may impact cognitive functioning, with learning and episodic and working memory representing vulnerable areas. This pilot study investigated whether cannabis, a commonly used substance with potential anti-inflammatory effects, can alter the effect of HIV on memory functioning in young adults with treated HIV infection.
Participants and Methods: Participants were 44 young adults age 18-24 with (n=28) and without (n=16) behaviorally acquired HIV. Participants completed the Hopkins Verbal Learning Test-Revised (HVLT-R; immediate recall, i.e. learning trials, and delayed recall of word lists) as well as Wechsler Adult Intelligence Scale-Fourth Edition Digit Span (working memory). The Customary Drinking and Drug Use Record measured self-reported substance use with cannabis use ranging from none to daily in both groups. Multivariable linear regression modeled cognitive performance as a function of HIV, past year cannabis use (<10 days vs. ≥10 days), and their interaction, and included demographic and other substance use covariates where indicated.
Results: All variables showed a significant interaction of HIV and cannabis use in analyses unadjusted for covariates, with differences for HVLT-R immediate and delayed recall persisting with adjustment. HIV infection was associated with worse performance when both groups had <10 days of past year cannabis use, but this group difference was reversed (for immediate recall) or attenuated (for delayed recall) with ≥10 days of use.
Conclusions: Young adults with HIV show worse verbal learning and memory than those without HIV in the context of no or minimal cannabis use. However, with more than minimal cannabis use, this effect is attenuated or reversed. Potential mechanisms underlying this interaction may include anti-inflammatory and immune protective effects of cannabis that differentially impact youth with a chronic inflammatory condition.
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E.W. PAOLILLO, E. PASIPANODYA, J.L. MONTOYA, R. MOORE, R. HEATON & D.J. MOORE. Perceived Cognitive Difficulties among Middle-Aged to Older Adults Living with HIV: Longitudinal Associations with Global Cognitive Functioning and Depressive Symptoms.
Objective: Although persons living with HIV (PLWH) may inaccurately estimate their objective level of cognitive functioning, their reports may reflect relative changes in cognition and/or mood (e.g., depression). Longitudinal exploration of these relationships is needed to further understand correlates of perceived cognitive difficulties among PLWH. We examined whether global cognitive functioning (GCF) and depressive symptoms independently contribute to perceived cognitive difficulties over time.
Participants and Methods: Participants were 696 PLWH aged 35-76 at baseline (M=49; SD=8.5), with an average of 5.7 visits (range=2-21) over an average of 5.1 years (range=0.5-14.5). Responses to 34 items assessing frequency of cognitive difficulties (*0=Almost Never* to *5=Almost Always*) on the Patient Assessment of Own Functioning Inventory (PAOFI) were summed. Practice-effect corrected global scaled scores (baseline M=9.0; SD=2.4) were used to represent GCF. The BDI-II measured depressive symptoms. Multilevel modeling examined longitudinal associations of perceived cognitive difficulties with GCF

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and depressive symptoms (random slopes specified for both). Covariates included demographics and markers of current HIV disease (CD4 count, viral detectability, duration of infection).
Results: Random slopes of within-person effects were significant such that participants had higher PAOFI scores on visits that they had worse GCF (B=-0.05, p<.001) and more severe depressive symptoms (B=0.19, p<.001). Across individuals, lower average GCF (B=-0.24, p<.001), higher average depressive symptoms (B=0.51, p<.001), and fewer years of education (B=-0.07, p=.024) related to higher PAOFI scores.
Conclusions: Perceived cognitive difficulties were associated with changes in both GCF and depressive symptoms. Although perceived cognitive difficulties assessed at any one time point are likely to be inaccurate indicators of GCF, monitoring changes in perceived cognitive difficulties may better identify older PLWH in need of neuropsychological follow-up.
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V.S. PHATAK, B. LEW, A. WIESMAN, M. REZICH, J. O'NEILL, K. ROBERTSON, S. SWINDELLS, P. MAY & T. WILSON. Neurophysiological Activity During Active Attention and Behavioral Processing Speed in HIV-Infected Individuals and Controls.
Objective: HIV associated neurocognitive disorder (HAND) shows a predilection for impairment in attention and processing speed. The objective of the present study was to investigate relationships between neurophysiological activity during an active attention task and processing speed on neuropsychological measures in individuals with HIV.
Participants and Methods: Participants with HIV (n=77) and age- and gender-matched control participants (n=94) completed a neuropsychological test battery and a visual discrimination task while undergoing magnetoencephalography (MEG). Control participants had significantly higher education (mean=17.99) than participants with HIV (mean=15.40) and partial correlations controlling for education were conducted between whole-brain neurophysiological measures and performance on neuropsychological tests to account for this in all analyses.
Results: Controls were faster on WAIS-III Digit Symbol (p<.001) but not different on Trails A (p=.274) compared to HIV-infected participants. Partial correlations of source-level oscillatory MEG activity with Trails A and Digit Symbol z-scores for both participants with HIV and controls were conducted. Fisher Z transformations were applied to the group correlations and statistically compared across groups. Significant group differences were found in the relationship between alpha activity and Trails A in right dorsolateral prefrontal cortex (p=.032). Group differences were due to significant negative correlations in the HIV group but not controls. Alpha activity and Digit Symbol did not show similar significant group differences.
Conclusions: The relationship between neurophysiological and neuropsychological activity differed between patients and controls, and differed by neuropsychological task. These findings also suggest the intriguing possibility of compensation that could be potentially harnessed through further investigation of brain-behavior relationships.
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A. PLUTA, T. WOLAK, M. SOBANSKA, N. GAWRON, A.R. EGBERT & E. LOJEK. The effect of HIV and age on brain structures and cognition in highly functioning and aviremic HIV+ patients.
Objective: Findings on the influence of age and HIV on brain and cognition remain equivocal, particularly in aviremic subjects without other age or HIV-related comorbidities. We aimed to examine the effect of HIV status and age on structural measurements and cognition in aviremic subjects with HIV on stable combination antiretroviral therapy (cART). We applied machine learning (SVM) to identify robust combinations of multivariate morphology patterns and cognitive functions that were most discriminative between groups.
Participants and Methods: Fifty-three HIV-seropositive patients and 62 healthy controls underwent neuropsychological testing (executive functions, attention, memory, learning, psychomotor speed, fluency) and volumetric MRI scans. Voxel-based morphometry, ANCOVAs, machine learning, and multivariate regression were conducted to determine the between group differences in terms of relationship of HIV status, age and their interaction on neurocognitive and structural brain measures.
Results: Volume and GM thickness of the caudate, parahippocampus, insula, and inferior frontal gyrus were smaller in seropositive subjects in comparison to HC. They also performed worse in complex attention and cognitive fluency tasks. SVM analysis revealed that the best between-group classification accuracy was obtained based on cognitive scores encompassing complex attention and psychomotor speed, as well as volumetric measures of white matter and total grey matter; 3rd, 4$^{th\ and}$ lateral ventricles; amygdala; caudate; putamen. Both VBM and regression analysis yielded that HIV and aging independently increase brain vulnerability and cognitive worsening.
Conclusions: Patients with HIV on effective cART demonstrate smaller volumetric measures and worse cognitive functioning relative to seronegative individuals. There is no interaction between HIV infection and aging.
This study was supported by the Polish National Science Center (UMO - 2012/06/M/H56/00316).
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R.N. ROBBINS, D.A. BYRD & S. MORGELLO. Construct validity of a tablet app to detect neurocognitive impairment among people living with HIV.
Objective: NeuroScreen is a brief, tablet-based neuropsychological (NP) assessment application (app) developed for use by any level of clinical staff to screen for neurocognitive impairment (NCI) among people living with HIV (PLWH). It is comprised of 10 brief NP tests assessing the domains of learning, memory, processing speed, executive functions, attention/working memory, and motor speed. This study examined the construct validity of each NeuroScreen subtest and the ability of the app to discriminate between impaired and unimpaired people.
Participants and Methods: One hundred forty-six adults (62% male, 47.92 mean years of age, 56% African American, 28% White, and 16% Other) adults in the New York Metro area living with HIV were administered NeuroScreen and then a gold standard comprehensive NP battery of well-established paper-and-pencil tests.
Results: Pearson correlation coefficients calculated between NeuroScreen raw tests scores and raw NP test scores indicated weak to strong statistically significant correlations between the NeuroScreen and NP tests of verbal memory (r = 0.32, p = 0.01), verbal learning (r = 0.24, p = 0.01), processing speed (r = 0.60, p = 0.01; r = 0.65, p = 0.01; r = .41, p = 0.01), working memory (r = .45, p = 0.01; r = .47, p = 0.05), executive functions (r = .32, p = 0.01; r = -.32, p = 0.01;), and motor functioning (r = .33, p = 0.01). Particiapnts with gold-standard defined NCI had significantly worse NeuroScreen total scores than those without NCI (p < 0.05).
Conclusions: Findings provide evidence that the NeuroScreen tests tap the NP domains of memory, working memory, processing speed, executive functions, and motor speed, and can detect performance differences among those with and without NCI. Although NeuroScreen shows convergence with paper-and-pencil tests for diverse adults in the Northeast Region of the US, further research is needed to evaluate test-retest validity, its ability to detect neurocognitive impairment, and if there are demographic factors that impact performance on it.

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M.J. SAVIN, T.M. SCOTT, P. OLSEN, C.L. CROOK, T.D. MARCOTTE, D.A. BYRD & M.G. RIVERA MINDT. The roles of past polysubstance use and depressive symptoms in the functional assessment of HIV-associated neurocognitive disorders (HAND).

Objective: History of substance use can reduce diagnostic accuracy of functional impairment (Hinkin et al., 2007). Past polysubstance use disorders (P-SUD) may also propagate depression and increase risk for functional impairment. However, no studies have investigated the impact of P-SUD and depression upon functional impairment. This cross-sectional study examined the effects of P-SUD and depressive symptoms upon subjective and objective measures of functional impairment in HIV-associated neurocognitive disorders (HAND).

Participants and Methods: A sample of 142 HIV+ adults (70% Latinx; 72% Male; *M* Age = 47±8 years; *M* Education = 13±3 years) completed subjective (Patients Assessment of Own Functioning [PAOFI] & Activities of Daily Living [ADL]) and objective (Medication Event Monitoring System [MEMS]) measures of functional impairment, DSM-diagnostics for substance use, and the Beck Depression Inventory (BDI-II). P-SUD was defined as >1 P-SUD diagnosis. Separate multilevel models tested the relationship of P-SUD and BDI-II upon functional impairment status (Unimpaired vs. Impaired) of the PAOFI, ADL, and MEMS, respectively. Current substance use was a covariate for all analyses.

Results: The presence of P-SUD increased risk for PAOFI impairment (B=0.18, t = 2.07, p=.04). In the presence of P-SUD, elevated BDI-II scores increased risk for PAOFI impairment ($B(u_{1j})$=0.24, $\chi^2(1)$= 2.53, p=.04). Together, these variables explained a significant amount of the variance (R^2=.61, p<.01). Neither the P-SUD or the BDI-II predicted ADL or MEMS impairment (ps>.05).

Conclusions: Past polysubstance use (P-SU) increases subjective reporting of neurobehavioral difficulties on the PAOFI. Coinciding depressive symptomology contributed to increases in subjective reporting. In contrast, P-SU and depressive symptomology did not impact the subjective ADL or objective MEMS measures. Investigators should use caution in solely using the PAOFI to assess functional impairment in HAND, particularly in cases of coinciding P-SU and depressive symptomology.

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O. STRAHAN, D. FERGUSON, P. DOCKREE, R. COEN, C. DOHERTY, S. MCKIERNAN, C. BERGIN, M. ASCIONE, C. GAUDINO & S. NORRIS. A High Prevalence of Cognitive Impairment in Chronic Hepatitis C Patients Attending an Irish Academic Hospital.

Objective: In Ireland, approximately 30,000-50,000 people are chronically infected with the Hepatitis C Virus (HCV). The reported prevalence of cognitive impairment is 30%, however, no Irish data exists on HCV-related neurocognitive deficits. The current study aims to determine the prevalence of cognitive impairment by screening all chronically infected HCV+ individuals, without marked liver disease, attending an Irish academic hospital.

Participants and Methods: 671 HCV+ individuals were assessed for cognitive impairment while attending routine clinical appointments in St. James's Hospital, Dublin. The assessment involved a patient interview and a cognitive assessment, which compromised of the validated Brief NeuroCognitive Screen (BNCS) and the Hospital Anxiety and Depression Scale (HADS). Results were adjusted using age and education matched normative data.

Results: 47% of HCV+ individuals screened positive for cognitive impairment. The population were majority male (67.6%), originating from Ireland (65.8%), and have a mean age and education level of 42 and 12 years respectively. The most commonly reported mode of HCV acquisition was previous intravenous drug administration (65.7%). Factors associated with a positive screen for cognitive impairment include prescription medications, current substance abuse, and depression and anxiety. 43% reported abnormal anxiety levels on the HADS, while only 13% of these have a diagnosis of anxiety. Similarly, 32.6% reported abnormal depression levels, while 54% of these have a diagnosis of depression.

Conclusions: The high prevalence rate highlights the importance of screening for cognitive impairment in HCV+ individuals. Emotional functioning should also be taken into consideration as it increases the risk of developing impairment. Future aspects of this study will address the pattern of HCV-associated neurocognitive dysfunction, and the potential reversibility of these deficits through viral eradication.

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K. TURESON, D.A. BYRD, E.P. MORRIS, A.C. SUMMERS, V. GUZMAN, C.L. CROOK & M.G. RIVERA MINDT. The Effects of Health Literacy on Prospective Memory in Latinx and Non-Hispanic White Persons Living with HIV (PLWH).

Objective: The US Latinx population is disproportionately affected by HIV and will comprise ~30% of persons living with HIV (PLWH) by 2050. Health literacy is significantly associated with neurocognitive (NC) performance, medication adherence, and clinical health outcomes (e.g., HIV viral load) in PLWH. However, the impact of health literacy on prospective memory (PM), a key facet of memory functioning related to medication adherence, has not been examined. This study examined whether significant associations exist between health literacy & PM in Latinx and non-Hispanic white (NHW) PLWH.

Participants and Methods: This cross-sectional study included 129 PLWH (71% Latinx & 29% NHW; 69% Male; *M* Age=48±8 years; *M* Education=13±2 years) who completed a NC battery, including the Test of Functional Health Literacy (TOFHLA) and the Memory for Intentions Screening Test (MIST). Covariates included quality of education (Wide Range Achievement Test-4 Reading Subtest, WRAT-4) and HIV viral load for multivariate analyses.

Results: An independent samples t-test revealed that TOFHLA scores were significantly lower among Latinx PLWH compared to NHW PLWH, $t(127)2.96$, p=.004. In the Latinx group, TOFHLA was positively correlated with MIST Summary Score (SS) & Recognition (r's=.32-.46, ps<.01), but was negatively correlated with MIST Total Errors (r=-.39, p<.001). Further, linear regressions revealed that our model (TOFHLA, WRAT-4 & HIV viral load) predicted MIST SS (R^2=.33, p<.001), MIST Total Errors (R^2=.14, p<.05), & MIST Recognition (R^2=.29, p<.001), with TOFHLA significantly contributing to each model (all ps<.05). In the NHW group, TOFHLA did not predict MIST performance (all ps>.05).

Conclusions: This study is the first to examine the impact of health literacy on PM in Latinx PLWH. Notably, TOFHLA was only significant for Latinx PLWH, suggesting a more salient association between health literacy and PM in this group. This highlights the need for future research to explore potential culture-specific mechanisms to contextualize this finding.

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Medical/Neurological Disorders/Other (Adult)

F. ARIAS, R. ARMSTRONG, M. RIVERSO, S. LEVY, D. ESTORES & C. PRICE. Pilot Study: Neurocognitive Disorders and Colonoscopy in Older Adults.

Objective: Colonoscopies are structural tests to detect colon abnormalities and remove pre-cancerous polyps. In older adults, colonoscopies are associated with medical and patient related risks revolving around missed appointments and poor bowel preparation (prep). Research has yet to examine whether preoperative cognition predicts colonoscopy-related outcomes. We examined frequency of missed colonoscopy appointments and poor bowel preparation relative to diagnoses of mild and major neurocognitive disorders.

Participants and Methods: This study involved a retrospective data review of patients seen from 08/7/18 to 12/20/18 (IRB-01 # 201800154). In a presurgical setting with an integrated neuropsychology team, adults >64 years who failed a frailty-cognitive screener completed a neurobehavioral exam that included a clinical interview, measures of attention/working memory, language, and episodic memory, as well as feedback. Licensed neuropsychologists reviewed de-identified patient data for neurocognitive disorders using DSM-5 criteria. Gastroenterologists completed Boston Bowel Preparation Scale scores (BBPS) at the end of each colonoscopy. A BBPS score of <1 in any segment of the colon indicated "inadequate" bowel prep. Independent *t*-test and Chi-square tests were calculated.

Results: Final sample included 47 individuals (M age=72.0±6. 6 yrs; M education= 12.9±3.3 yrs). Nine patients did not present for their scheduled appointment (non-completers) and each met diagnostic criteria for major neurocognitive disorder. Relative to peers, non-completers had fewer years of education (t (44) = -2.1, p = 0.04) and more medical comorbidities (t (45) = 2.78, p = .008). Of the 38 completers, 18 and 5 met diagnostic criteria for mild and major neurocognitive disorder, respectively. Patients with major neurocognitive disorder who presented for a colonoscopy had inadequate bowel prep.

Conclusions: Neurocognitive disorders are risk factors for missed appointments and inadequate bowel preparation.

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M. CAIRNCROSS, K. SEAGLY & T. SHERMAN. The neuropsychological profile of a 35-year-old woman with dentatorubral-pallidoluysian atrophy: A case report.

Objective: Dentatorubral-pallidoluysian atrophy (DRPLA) is a rare autosomal dominant neurodegenerative disorder. The prevalence of DRPLA is approximately 0.48:100,000 in the Japanese population and extremely rare in the US. Limited aspects of neurocognitive dysfunction in DRPLA have been reported, such as intellectual deterioration in childhood-onset and dementia in adults; however, no comprehensive characterization of cognitive functioning has been reported. The objective of the present case report was to first provide a thorough characterization of cognitive functioning in DRPLA. Addiontally, no disease specific interventions for DRPLA exist within the literature. Thus, a second purpose of this case is to discuss implications and recommendations for the patient and her caregiver.

Participants and Methods: The case of a 35-year-old, right-handed, African American woman with 13 years of education and genetically confirmed DRPLA is presented. There was no reported family history of DRPLA.

Results: Intellectual functioning fell in the extremely low range (FSIQ SS = 53), almost certainly a significant decline from premorbid levels estimated to be average based on demographic and baseline indicators. Neuropsychological performance was characterized by impairment across cognitive domains, including basic attention, aspects of language, manual dexterity, processing speed, memory, visual spatial and executive functioning, but with relative preservation in the areas visual abstract reasoning and isolated tests of working memory.

Conclusions: A diagnosis of major neurocognitive impairment secondary to early adult-onset DRPLA was made. Given the patient's previous functioning, including no history of learning difficulties, 13 years of formal education, gradual deterioration in her ability to succeed at school and 'regression' to child-like behaviours, her presentation is best characterized as early adult-onset DRPLA, which is often associated with intellectual deterioration or early-onset dementia.

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K.E. DOROCIAK, L. PIPER, T. KELLEHER, R. MOLOKIE & J.K. JANECEK. Pain and Neuropsychological Performance in Sickle Cell Disease.

Objective: Sickle cell disease (SCD) is a major public health concern associated with individual and societal costs. Acute and chronic pain are primary symptoms of SCD. Research with chronic pain patients has found pain to impact cognitive functioning, including attention, verbal memory, and executive functioning, as well as emotional functioning. The purpose of the present study was to examine the relationship between pain, depression, and cognitive functioning in adults with SCD.

Participants and Methods: Participants were 73 adults with SCD referred for routine neuropsychological evaluation at the University of Illinois at Chicago (M_{age} = 39.03, SD = 12.90). Participants' pain (PASS-20) and depression (BDI-II) were assessed using self-report measures. Neuropsychological tests were administered to examine attention/processing speed (TMT-A), verbal memory (HVLT-R delay recall), and executive functioning (WCST number of categories).

Results: After adjusting for depression, hierarchical regression analyses revealed that greater pain significantly related to poorer verbal memory performance (p = .027), but not attention/processing speed or executive functioning (p >.05). In addition, greater pain significantly related to greater depressive symptoms (p <.001). Post-hoc analyses revealed a significant interaction between pain and depression in predicting verbal memory, such that in conditions of greater depressive symptom severity, pain significantly predicted poorer verbal memory performance, β = -.27, p =.020. However, in the context of lower depressive symptom severity, pain did not predict verbal memory, p =.160.

Conclusions: Greater pain related to poorer verbal memory performance in adults with SCD, especially for those with greater depressive symptom severity. Future research should investigate how pain and psychological distress impact cognitive functioning to better inform clinical care.

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K.E. DOROCIAK, J. SOBLE, J.W. FINK, P.A. RUPERT & N.H. PLISKIN. Pain and Neuropsychological Performance following Electrical Injury.

Objective: Electrical injury (EI) is a significant medical trauma associated with multifactorial sequelae. Individuals sustaining an EI may experience cognitive impairment in several domains, including verbal memory, attention, and executive functioning as well as emotional symptoms such as depression and physical symptoms such as chronic pain (CP). While several factors may contribute to the cognitive impairment experienced in EI patients, research with CP patients demonstrates that pain may influence cognitive functioning either directly or indirectly by influencing emotional distress which then impacts cognitive functioning. The purpose of the current study was to examine whether pain influences EI patients' mood and cognition in similar ways as compared to CP patients.

Participants and Methods: A clinical sample of 52 EI patients (88.5% male; M_{age} = 44.38 years) completed self-report measures of pain somatization (PCS) and depression (BDI-II) as well as objective cognitive measures to examine attention/processing speed (TMT-A), verbal memory (HVLT-R), and executive functioning (WCST). The study also included a CP sample of 52 patients matched for age and gender.
Results: After adjusting for pain and psychiatric medication use, greater pain somatization significantly related to poorer attention/ processing speed (p = .007) and verbal memory performance in EI patients (p =.039). While depression was significantly correlated with pain somatization (r = .51), depression did not mediate the relationship between pain somatization and cognition in EI patients. When comparing the EI and CP patients, results suggested that the relationship between pain and cognition was similar for the two clinical groups.
Conclusions: Findings indicate that pain impacts mood and cognition in EI patients. Thus, the influence of pain and its effect on cognition should be considered in the assessment and treatment of patients who have experienced an EI.
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E.L. DUCCA, B. COSTABILE, A. CRETE, A. PAGUYO, D. FOSSATTI, L. KEATING, S.G. SCHAFFER & K. WALKER. Cognitive predictors of mortality among survivors of non-neurological critical illness.
Objective: Although treatment for critical illness has improved within the last few decades, the one-year mortality rate following critical illness remains exceedingly high. A large number of individuals admitted to the intensive care unit (ICU) for non-neurological critical illness develop cognitive impairment; however, the prognostic implications of early post-ICU cognitive impairment are unclear. The present study examined whether cognitive impairment in the days following ICU discharge is associated with 1-year mortality.
Participants and Methods: Sixty-five participants without pre-existing neurocognitive impairment admitted to the ICU >72 hours and diagnosed with septic shock and/or respiratory failure were enrolled. The Mini Mental Status Exam (MMSE) and a list learning measure from the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) were administered within 3 days of ICU discharge. Deaths were confirmed using telephone follow-up at 4 and 8 months, surveillance of medical records up to 1 year after ICU discharge, and an obituary review. MMSE score of 27 and RBANS list learning score of -1.5 standard deviations (SD) were used to define post-ICU cognitive impairment.
Results: 20% of participants died within one year of ICU discharge. After adjusting for age, sex, race, and delirium, participants with an MMSE <27 had an equal hazard rate as those with MMSE >27 (HR=.95, SE=.60, p=.93). However, participants with RBANS list learning score 1.5 SD or more below the normative mean were four times as likely to die compared to those with higher scores (HR= 4.07, SE= 2.85, p=.045).
Conclusions: Poorer verbal memory in the days after ICU discharge is independently associated with 1-year mortality. These findings suggest that memory measures may serve as a predictor of mortality among survivors of critical illness and highlight the potential utility of cognitive assessment in the critical care setting.
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E.C. DUGGAN, K.P. NITSCH & M.T. WAGNER. Acetazolamide used as an alternative to ventriculoperitoneal shunt in a case study of idiopathic normal pressure hydrocephalus.
Objective: A case report of idiopathic normal pressure hydrocephalus (NPH) treated with off-label acetazolamide (Diamox) is presented for an individual unable to tolerate a lumbar drain.
Participants and Methods: A 33-year-old female presenting with classic triad symptoms of NHP was evaluated outpatient and admitted for a lumbar drain trial in anticipation of possible ventriculoperitoneal (VP) shunt. An MRI showed ventriculomegaly, and after an initial positive response to the CSF drain, the trial was discontinued because adverse side-effects. As an alternative therapy, off-label acetazolamide (thought to directly inhibit the production of CSF) was titrated to 250 mg bid with neuropsychological follow-up at 8 months. Outcome measures were self-report and serial objective scores on Block Design, Information, Coding, HVLT, BVMT, BDI, and dual-task gait analysis.
Results: At 8-month follow-up there was significant improvement for signs and symptoms of NPH. Gait, incontinence, and cognition were reportedly improved. Objectively significant improvements were seen in visual memory on BVMT and dual-task gait (reliable change scores p<0.05). Other cognitive scores remained stable.
Conclusions: This case report is unique as VP shunting is the standard of care and there are only scant reports of medical therapy used for the treatment of NPH. To our knowledge, this is the first case report of the use of acetazolamide with rigorous clinical outcome measures including pre/post neurocognitive data and dual task gait analysis. There is only one small case series study in the literature using acetazolamide to treat NPH embedded within a larger MRI investigational study where there was limited gait analysis and no cognitive outcome measures (Alerin et al., 2014). The current study adds to this literature and supports an interesting alternative treatment option that is important given the high morbidity and low response rate of the VP shunt diversion procedure for NPH.
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H. FERNANDO, R. COHEN, J. FRIEDMAN, A. AYZENGART, J. GULLETT, E. PORGES, A. WOODS, J. GUNSTAD, C. OCHOA & K. CUSI. The Role of Comorbid Vascular and Metabolic Risk Factors in Obesity-Related Neurocognitive Deficits.
Objective: Elevated body mass (BMI) is associated with cognitive deficits in both the general population and in the context of medical conditions. This study examined the relationship between specific metabolic and vascular risk factors and cognition in adults with morbid obesity.
Participants and Methods: 132 adults with Class II/III obesity, ages 20-75, were enrolled in a NIDDK-sponsored study of the effects of weight reduction and improved diabetes status following bariatric surgery. Individuals underwent a baseline neuropsychological assessment sensitive to impairments of attention, working memory, executive skills, processing speed, memory, and verbal fluency. Regression analyses examined association between cognition and common obesity-associated risk and etiological factors (BMI, hemoglobin A1c, diabetes, hypertension, sleep apnea, and osteoarthritis).
Results: Diabetes diagnosis was associated with deficits in processing speed (β = -.24[$CI^{95\%}$ -.45, -.04], p = .02) and executive domains (β = -.25[$CI^{95\%}$ -.45, -.04], p = .01), while A1c status was inversely related to attention (β = -.30[$CI^{95\%}$ -.48, -.04], p = .02) and overall cognition (β = -.39[$CI^{95\%}$ -.58, -.11], p = .005). Apnea was not associated with cognitive performance, though CPAP use was associated with stronger learning and memory (β = .22[$CI^{95\%}$ .01, .43], p = .04). Elevated BMI was associated only with reduced verbal fluency (β = -.23[$CI^{95\%}$ -.45, -.03], p = .03), suggesting that excessive BMI beyond the diagnostic thresholds was not the primary factor underlying greater cognitive dysfunction in this cohort. Rather, diabetes-associated metabolic disturbances appear to play a greater role.
Conclusions: Results of our future longitudinal analyses of changes in metabolic and vascular risk factors following bariatric surgery will help determine whether improvements in cognitive and brain function associated with weight loss are tied to alternations of specific pathophysiological mechanisms.
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M. HARCIAREK, P. KRUKOW, K. JONAK, A. MANKOWSKA, B. BIEDUNKIEWICZ, A. DEBSKA-SLIZIEN & J. MICHALOWSKI. Abnormally Increased Power and Synchronization of Electroencephalographic Signals in Dialyzed Patients with End-Stage Renal Disease.

Objective: Dialyzed patients with renal disease often present with brain and cognitive abnormalities that result from the accumulation of uremic toxins, co-occuring pathologies (e.g. hypertension) and adverse effects of dialysis. However, little is known about these patients' electrophysiological activity, particularly the signal strength as well as the structure of this signal in different frequencies and areas of the cerebral cortex. Hence, the aim of this study was to identify these features.

Participants and Methods: 36 hemodialyzed patients (HD) and 32 demographically matched healthy controls (HC) underwent a resting-state 128-channels EEG recording in eyes-closed condition. Recording was made with active 0.5–50 Hz band-pass filter with the sampling rate of 1000Hz and electrode impedance <10kOhm. Signal preprocessing included selection of artefact-free 30s time section for every subject. Next, spectral analysis, based on the Welch power spectral density function, was conducted to decompose the EEG signal into delta, theta, alpha, beta and gamma frequencies.

Results: Compared to HCs, patients had a higher average signal power, resulting mainly from group differences in theta and alpha frequencies. After averaging the signal power for electrodes covering frontal, central parietal and occipital regions, more variable spectral power in HDs in the delta, theta and beta frequencies was detected. A between-regions synchronization of EEG activity was also substantially stronger in HDs, especially in lower frequencies.

Conclusions: Dialyzed patients have increased cortical electrophysiological activity, especially in low frequencies, accompanied by a hyper-synchronization of various cortical areas. Future studies should test if these abnormalities are treatment-related and/or result from frequently seen in this population white matter pathology that lead to cortical disinhibition and changes in neural communication processes, i.e. prioritizing synchronization on cortical surface due to a damage to axonal subcortical connections.

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K. HARTNACK, H. SUN, L. PAIXAO, D. ZHOU, L. MCCLAIN, P. PURDON & M. WESTOVER. Delirium Burden Independently Predicts Three-Month Mortality of Mechanically Ventilated ICU Patients.

Objective: The impact of delirium on mortality is inconsistent in the ICU literature. Some studies conclude that delirium increases ICU mortality and long-term mortality, while others suggest delirium exerts no effect on mortality. The objective of this study was to determine if delirium is an independent predictor of mortality and to develop a new statistical model for predicting three-month mortality in critically ill patients.

Participants and Methods: We conducted a prospective observational study of mechanically ventilated adult patients admitted to ICUs of a university-based medical center between 2013 and 2016. Patients were assessed for delirium beginning in the ICU until hospital discharge using the Confusion Assessment Method – ICU (CAM-ICU). The CAM-ICU assesses four binary features: acute onset or fluctuating course, inattention, altered level of consciousness, and disorganized thinking. In addition to recording the presence of delirium, the presence of each of the individual features of the CAM-ICU was recorded and used to define patients' delirium status. Delirium burden was quantified in two ways: total days with delirium; and a new measure proposed in this study, delirium fraction: days delirious divided by days under observation. The primary outcome was three-month mortality. We evaluated a series of logistic regression models, and compared their predictive accuracy using area under the receiver operating curve (AUROC).

Results: Among 165 patients, 42 (25.5%) were deceased at three months. The most accurate model predicting three-month mortality had AUROC of 0.89 (CI: 0.81-0.94), which included delirium fraction. This model was more accurate ($p = 0.0001$) than the model that included the total number of days delirious (AUC: 0.68).

Conclusions: This study supports the claim that delirium independently increases mortality. Our results also suggest that delirium fraction predicts mortality more accurately than the number of days with delirium.

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M.B. JURADO, M. PALACIOS-MENDOZA, X. GAMBOA, C. CEVALLOS, D. MORENO-ZAMBRANO, M. DUARTE, C. PENAHERRERA, L. TAMARIZ & R. SANTIBANEZ. Comorbidity of Depression and Diabetes is not Associated with Increased Cognitive Impairment in Middle Aged Adults.

Objective: Comorbidity of diabetes and depressive disorder has often been associated with poor clinical outcomes and increased risk for cognitive decline in older adults. We aimed to evaluate the effect of depression and diabetes on cognitive function in middle-aged adults. The effects of educational attainment are also considered. We expected poorer cognitive functioning in diabetics with comorbid depressive symptoms.

Participants and Methods: 274 Spanish-speaking participants (46% diabetics, 62% female, 61.43 ± 3.1 SD years of age, 12.63 ± 4.64 SD years of schooling) underwent laboratory and neuropsychological testing. Diabetes diagnosis was made according to established criteria. Depressive symptoms were evaluated using the Center for Epidemiological Studies Depression Scale (CES-D). Neuropsychological measures were grouped into three cognitive domains with acceptable internal consistency: attention/Information processing (α=.845), bemory (α=.857) and executive function (α=.743). Multiple regression analyses were conducted to examine the influence of diabetes status, presence of depressive symptoms and interaction between both variables on cognitive functioning.

Results: Poorer cognitive functioning was found in all cognitive domains for diabetics compared to non-diabetics. Presence of depression symptoms was not associated with increased cognitive impairment. The interaction between depression and diabetes status was not a significant predictor for attention/information processing (β=-.064, p=.355), memory (β=- .043, p=.576), and executive function scores (β=-.050, p=.467). Cognitive dysfunction was significantly associated with diabetes status and low educational attainment.

Conclusions: Our results are not consistent with published reports on increased cognitive impairment associated with comorbidity of depression and diabetes. Issues relating to the appropriateness of depression screening tools in various cultural contexts, and the impact of low educational attainment on cognitive functioning should be considered.

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M. LEGARRETA, E. MCGLADE & D. YURGELUN-TODD. Veterans with Chronic Pain: The Neuropsychological Impact.

Objective: Chronic pain (CP) has been associated with reduced cognitive skills; however, previous research has been inconsistent with regard to method of pain measurement. We have completed a preliminary study of the association between pain and cognitive performance in a sample of Veterans with CP.

Participants and Methods: A total of 61 Veterans (mean age 37.79 years) completed neuropsychological (NP) testing including the Ruff 2&7 Selective Attention Test and the Wisconsin Card Sorting Test. Pain was measured by the McGill Pain Questionnaire and a Visual Analogue Scale. Sensory and Affective subscale scores of the McGill were used to assess functioning related to pain.

Results: Intensity of pain was associated with attentional processes. Highest pain rating was negatively correlated with errors (auto detection r = -.294, p<.01; controlled detection r = -.227, p=.05), and positively correlated with accuracy (total accuracy r = .268, p=.02). Sensory pain, but not affective pain was associated with planning and organization skills. Sensory pain was negatively correlated with trails administered (r = -.241, p-.04) and perseverative errors (r = -.296, p=.01) on the WCST.
Conclusions: The Ruff findings indicate improved attentional capacity with higher pain intensity which may be associated with an increase in arousal. In contrast the WCST results suggest impaired planning and organizational capacity with increased sensory pain descriptors. Interestingly, pain intensity and pain disability did not seem to impact neuropsychological NP performance. These findings demonstrate an association between chronic and neuropsychological (NP) performance and suggest that pain intensity and sensory pain are especially relevant when discussing reduced cognitive capacity in Veterans with CP.
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K.A. LEHOCKEY. The Nature of Cognitive Impairment in an Inpatient Cardiac Rehabilitation Sample.
Objective: Previous research found no significant differences between inpatients in cardiac versus stroke rehabilitation on brief cognitive assessment. These findings highlighted the importance of cognitive assessment for inpatients participating in cardiac rehabilitation as they do not often have a known acquired brain injury. The aim of the current study was to investigate the cognitive profile of cardiac inpatients by comparing their domain scores to those of inpatients in stroke rehabilitation.
Participants and Methods: Data were obtained from 158 adult inpatients at the MedStar National Rehabilitation Hospital (NRH). Inpatients were grouped by primary diagnosis on admission: 113 Cardiac and 45 Stroke. Patients were administered the UAB Spain Rehabilitation Center: Cognitive Log (C-Log) within one week of their admission to NRH as part of their initial neuropsychological evaluation.
Results: Independent samples t-tests were conducted to compare C-Log performance across two inpatient rehabilitation groups (i.e., Cardiac and Stroke). While there was no significant difference in overall C-Log scores between Cardiac (M=23.68, SD=3.56) and Stroke (M=22.47, SD=3.84), t(156)= 1.89, p=.06 or most cognitive domains, a significant difference was observed in executive functioning between Cardiac (M=3.84, SD=1.23) and Stroke (M=3.38, SD=1.39), t(156)=2.06, p=.04.
Conclusions: The Cardiac group was not significantly different from the Stroke group in gross cognition, orientation, immediate verbal recall, attention/working memory, or delayed verbal recall. However, the Cardiac group performed significantly better on items assessing executive functioning than the Stroke group. It should be noted that both groups displayed overall clinically impaired gross cognition with specific impairments in the areas of attention/working memory and executive functioning. Findings highlight the clinical utility of considering cognitive strengths and weaknesses to enhance participation and outcomes.
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A. MATCHANOVA, K. CLARK, L.O. ORZECK, D.A.G. DRABICK, A. HAGERTY, T.F. FLOYD, C. PRICE & T. GIOVANNETTI. Long Term Post-Operative Cognitive Improvement after Cardiac Surgery: A Meta-Analytic Review.
Objective: Postoperative cognitive dysfunction is frequently reported within the first few weeks after cardiac surgery. However, reports of longer-term cognitive outcomes have been mixed. This meta-analysis examined longer term cognitive outcomes post cardiac surgery.
Participants and Methods: Major search engines (e.g., PubMed, Google Scholar) were explored for articles on cognitive outcomes at 6 months to 6 years after cardiac surgery. Pre- and post-cognitive scores (*M, SD*) and sample sizes were obtained. Each outcome was classified according to the cognitive domain tested (attention, episodic memory, executive function, visuospatial abilities).
Results: Twenty-six studies including 3,851 cardiac surgery participants were identified. A small but statistically significant improvement in post-surgical scores was observed across all outcomes (Hedges' g = 0.11, 95% CI = 0.05-0.17, p = .001), with significant heterogeneity noted among study effect sizes (Q [25] = 125.43, p< .001). Moderation analyses showed significant differences across tests of specific cognitive domains, such that significant improvement was observed only on tests of episodic memory (Hedges' g = 0.26, 95% CI = 0.17-0.35, p< .001) and visuospatial abilities (Hedges' g = 0.13, 95% CI = 0.10-0.16, p< .001). Effect sizes were not significant for tests of basic attention (Hedges' g = 0.05, 95% CI = -0.01-0.11, p=.09), executive function (Hedges' g = 0.03, 95% CI = -0.03- 0.10, p= .40), or language (Hedges' g = 0.03, 95% CI = -0.07- 0.12, p= .61).
Conclusions: Variability in longer-term post-surgical cognitive outcomes in cardiac patients may be partly explained by the cognitive domains assessed. There was no evidence for post-surgical decline in any of the cognitive domains, but the results implied that significant improvement may be expected in episodic memory and visuospatial abilities. Thus, patients who show persistent cognitive impairment more than 6 months post- cardiac surgery are atypical and should be treated clinically.
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L. MOSSMAN, M. AGHVINIAN, K. ALVAREZ, M. GAVILANES, K. TROXELL & A. ARENTOFT. Zenith Viral Load and Neuropsychological Functioning in HIV+ Individuals with Undetectable Viral Load.
Objective: Many HIV+ individuals experience cognitive dysfunction despite treatment (Heaton et al., 2010). Lower HIV viral load (VL) is associated with better cognitive function (Marra et al., 2003), and patients with undetectable VL show better neuropsychological function than detectable patients (Janssen et al., 2015). Research examining cognition and zenith VL in undetectable patients is lacking. This study compared undetectable HIV+ persons with higher zenith VL to undetectable patients with lower zenith VL on cognitive function.
Participants and Methods: 42 HIV+ participants with currently undetectable VL, based on lab results, and 9 HIV- controls received neuropsychological testing. HIV+ patients reported their zenith VL. A median split separated HIV+ individuals into higher zenith VL (n=21) and lower zenith VL (n=21) groups. HIV+ participants were also split into two groups based on WHO criteria for past treatment failure, i.e., VL greater than 5,000 copies/mL (past TF n=29, no TF n=13).
Results: One-way ANOVAs showed that participants significantly differed on Memory (F(2,48)= 3.88, p=.03 for median split; F(2,48)=3.80, p=.03 for treatment failure), Executive Function (F(2,48)=4.85, p=.01 for median split; F(2,48)=4.87, p=.01 for treatment failure) and Global NP T-Scores (F(2,48)= 4.04, p=.02 for median split; F(2.48)= 4.32, p=.02 for treatment failure). Post hoc testing indicated that HIV- controls showed significantly better NP performance compared to lower zenith VL participants and for EF, higher zenith VL participants (p's< .05).

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Conclusions: Preliminary results indicate that higher zenith VL may not have a lasting negative effect on cognitive function in HIV patients with currently undetectable VL. In addition to global NP, both VL groups performed significantly worse in executive function and memory compared to controls, supporting research finding that these areas are especially vulnerable to the effects of HIV (Melrose et al., 2008; Cattie et al.).
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Y. RAMIPHOUR, B. KOO, J. AJAMA, L. STEELE, D. LITTLE, R. KILLIANY & K. SULLIVAN. Alterations in the Integrity of Major White Matter Pathways in Veterans With Gulf War Illness (GWI).

Objective: Approximately one third of veterans who deployed to the 1991 Gulf War suffer from a chronic disorder called Gulf War Illness (GWI) which is characterized by symptoms including cognitive dysfunction, debilitating fatigue, joint and muscle pain, skin rashes, and gastrointestinal problems. Meta-analyses of cognitive data from these veterans has shown significant decrements in visuospatial skills, executive function, attention, and learning and memory. Magnetic Resonance Imaging (MRI) of veterans with GWI have found reduced white matter volumes in the brain. In order to gain a better understanding of the microstructural changes in the remaining white matter, we assessed the major white-matter pathways using diffusion-weighted MRI (DWI).
Participants and Methods: Data were obtained from 60 veterans of the 1991 Gulf War (12 healthy and 48 with symptoms of GWI) as part of the Boston University Gulf War Illness Consortium (GWIC). We used Freesurfer v6 TRActs Constrained by UnderLying Anatomy (TRACULA) function to reconstruct 18 major pathways in the brain of each subject. A single high resolution structural scan and a High Angular Resolution Diffusion-weighted Imaging (HARDI) scan was input into TRACULA. For each pathway, we obtained measures of average Fractional Anisotrophy (FA), Radial Diffusivity (RD) and Mean Diffusivity (MD).
Results: Independent samples student's t-tests were used to identify differences between the groups for each of the white matter tracts. These analyses revealed that the microstructural integrity of the Superior Longitudinal Fasciculus (SLF) was compromised in veterans with GWI.
Conclusions: These results suggest that the SLF, a white matter pathway that connects the frontal lobes to the rest of the brain, plays a central role in the etiology of the cognitive deficits found in GWI.
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A.D. ROCHETTE, M. SPITZNAGEL, G. STRAIN, M. DEVLIN, R. CROSBY, J.E. MITCHELL & J. GUNSTAD. The Relationship Between Symptoms of Polyneuropathy and Cognitive Function Pre- and Post-Bariatric Surgery.

Objective: Severe obesity is associated with elevated risk for cognitive impairment. Many of the mechanisms thought to underlie this relationship are also implicated in the pathogenesis of polyneuropathy, a peripheral neuropathy defined by symmetrical distal-to-proximal sensory and motor nerve damage. Researchers have suggested that polyneuropathy may be an important predictor of cognitive impairment of a vascular etiology due to their shared mechanisms, but this relationship has not been examined to date. The current study examined this relationship before and after bariatric surgery in a sample of individuals with severe obesity.
Participants and Methods: Data were extracted from the Longitudinal Assessment of Bariatric Surgery (LABS) project for those individuals with complete medical history and computerized *Integneuro* cognitive testing pre- and 12-months post-surgery. Polyneuropathy symptoms were operationalized using the Michigan Neuropathy Screening Instrument Questionnaire. The study had a final sample of 66 bariatric surgery patients (43.21±9.98 years, range=22-60; BMI=45.86±5.08; 87.9% female).
Results: Regression analyses showed that greater polyneuropathy symptoms were associated with poorer executive function performance at baseline ($\Delta F(1,63) = 4.23$, $\Delta R^2 = .06$, $p < .05$). However, they were not associated with performance in language, attention, or memory at baseline or the improvements in cognitive function at 12 month follow-up (all $p > .05$).
Conclusions: As hypothesized, greater polyneuropathy symptoms predicted poorer executive function at baseline. Future work is needed to replicate these findings and examine potential mechanisms for this relationship, such as oxidative stress, inflammation, and glycemic control.
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C. RUIS, A. SMITS, P. ROBE, C. DIJKERMAN & M. VAN ZANDVOORT. "I had Lost the Sense of Direction on my Left Body Part" Proprioception and Awake Brain Surgery: a Case Report.

Objective: Monitoring proprioceptive functions during an awake brain surgery has been described only sporadically, and is usually done by just asking a patient to describe any experienced sensations. We present a patient with clearly disturbed proprioceptive functions due to a partly cystic, right parietal brain tumor. Based on the expected functionallity of the area and to prevent permanent impairments, awake brain surgery was planned and proprioceptive functions were extensively tested during the pre-, intra- and postoperative phase.
Participants and Methods: Our case is a 64-year old, right-handed woman. In a period of two 2 weeks she developed several complaints. First, she noticed that when cycling she had troubles finding her foot pedal. Later on, she developed problems in putting on make-up and earrings with her left hand, walking, taking the stairs, fasten a seat belt, etc.
Pre-operative assessment of proprioceptive functions showed impairments at the contralateral side, distal more than proximal. Strenght and sensibility of her left hand were normal.
Results: During awake surgery proprioceptive functions were tested, in addition to motor functions, reading, calculation and clock reading. After debulking the cyst, an immediate improvement of proprioception and motor functions of the left hand was seen. Intraoperative cortical stimulation in depth part of the tumor resulted in mistakes in judging position sense of the left toe. One day after surgery, motor and proprioceptive functions of the hand were unimpaired. Four weeks later, our case had no difficulties in performing daily activities. Four months after surgery she was still doing well. Proprioception was unimpaired at both follow-up assessments.
Conclusions: This case report demonstrate the impact of proprioceptive impairments on daily life and shows that extensive monitoring of these functions during awake brain surgery is feasible and important. Our case reported an improved quality of life after surgery.
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C.B. SCHOEN, J.F. RATH, D. LITKE, W. PIGEON, K. QUIGLEY, S. LU, D. HELMER & L.M. MCANDREW. Neuropsychological Functioning of Veterans with Gulf War Illness.

Objective: Gulf War Illness (GWI) is a chronic multi-symptom illness affecting Gulf War Veterans (GWVs). Concomitant symptoms include fatigue, pain, and cognitive dysfunction; the latter being one of the most prevalent complaints overall[1]. Inconsistencies in case definitions of GWI have limited existing research due to characteristic differences in GWI samples across studies. Moreover, neuropsychological literature in GWI is mixed; several studies show reduced performance on objective measures of cognitive functioning, but in varying domains[2]. Most widely accepted definitions of GWI rely on self-reported symptoms alone, limiting potential for diagnostic clarity. The current study aims to describe the neuropsychological characteristics of a robust sample

of GWVs with GWI. Findings clarify the cognitive profile of GWI, providing opportunity for improved conceptualization and treatment in a unique, high-risk population.

Participants and Methods: As part of an ongoing randomized controlled trial, GWVs with subjective symptoms consistent with GWI were included in the present study. A subset of them (n=135, age M=51 yrs) were administered a brief battery of neuropsychological tests: Category Test – Russel Revised (RCat), Stroop Color-Word Test, Trail Making Tests A&B, Conners' Continuous Performance Test, and Rey-15 Item Test.

Results: Standard scores for above tests will be reported. Preliminary results (n=135) show evidence of objective cognitive impairment in GWI; particularly, relative decline in performance on a measure of executive functioning (RCat mean scaled score=6.66; T-score=39).

Conclusions: Findings indicate that GWVs with GWI demonstrate objective cognitive impairment, particularly in aspects of executive functioning. Elucidation of the neuropsychological profile of GWI provides better understanding of specific abilities affected and has clinical implications for improved interventions aiming to increase awareness of cognitive strengths/weaknesses and discrepancies between subjective reports and objective performance.

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J. COLLER, N. KLIMAS, L. STEELE, R. TOOMEY, M. KRENGEL, R. KILLIANY, J. AJAMA & K. SULLIVAN. Immune Genetic Variability is Associated with Gulf War Illness: A Preliminary Study Report.

Objective: There is mounting evidence that CNS inflammatory markers and resultant immune system activation play key roles in the development and severity of chronic Gulf War Illness (GWI) symptoms. This is a preliminary report of an ongoing study that is investigating the impact of immune genetic variability on both risk and severity of GWI in Caucasian veterans of the 1990-91 Gulf War.

Participants and Methods: To date, 87 veterans have completed the study, 71 with (56 male, mean age 51.5y) and 16 without (16 male, mean age 52.6y) GWI defined by the Kansas criteria. Genetic variability from 21 single nucleotide polymorphisms (SNPs) related to immune system response was determined with custom-designed Sequenom MassArray (iPLEX GOLD) analysis. McGill pain scores, CPT3: hit reaction time raw scores, and MFI-20: multi-dimensional fatigue inventory scores from questionnaires and brain region volume data from MRI were collected. Associations between genetic variability and risk of GWI were determined by odds ratios (OR, 95% confidence intervals [CI]). Impact of genetic variability on symptom scores and brain region volumes (subset of 43 GWI cases) were assessed by Mann-Whitney or Kruskal-Wallis tests.

Results: The *TGFB* (transforming growth factor beta, rs1800469) variant allele was significantly associated with occurrence of GWI (OR [95% CI]=3.3 [1.2-9.1], P=0.02). There was a significant association between *IL-10* (interleukin-10, rs1800896) genotype and McGill pain scores (median scores: A/A=22, A/G=32, G/G=42, P=0.007) in veterans with GWI, but not in those without GWI. No other genetic variant was associated with pain, CPT3 or MFI-20 scores or brain region volumes in GWI cases.

Conclusions: Preliminary results indicate that *TGFB* genotype may be a predictor of GWI risk, whilst *IL-10* genotype may predict pain severity in GWI veterans. This study is ongoing and also investigating these relationships in veterans of other ethnicities.

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M. LENOX & V. TRAN. The Relationship Between Body Weight, Cognition, and Acute Myocardial Infarction in Older Adults.

Objective: Cognitive impairment is expected in older adults with a history of acute myocardial infarction (AMI). We examined the potential impact of body mass index on cognitive functioning in older adults with AMI.

Participants and Methods: Data analyzed was derived from a de-identified database of older adults (age>=65) with AMI from the National Alzheimer's Coordinating Center (NACC). The sample (N=5621; 63.5% Male; 81.9% Caucasian; M_{age}=78.59 years; SD_{age}=8.52 years; M_{Ed}=15.06 years; SD_{Ed}=6.59 years) was sorted into 3 groups: underweight [N=74], normal weight [N=1754], and overweight/obese [N=3793]. All subjects completed a neuropsychological battery and the Cognitive Dementia Rating Scale (CDRS). A one-way MANOVA was conducted to compare the groups' results on cognitive testing and the CDRS.

Results: A MANOVA revealed a significant overall effect for the model at α=.01, Wilks' λ=.976, $F(20, 11218)$=6.892, p<.001. Tests of between-subjects using a Bonferroni adjustment found that the overweight/obese group obtained poorer scores on tests of simple attention, working memory, and adaptive functioning but greater scores on processing speed and executive functioning than the normal weight group. The underweight group obtained poorer scores on tests of processing speed and executive functioning but improved scores on adaptive functioning than the normal weight and overweight/obese groups.

Conclusions: Results evidenced higher levels of cognitive functioning in certain areas for the overweight/obese group. It seems possible that higher body weight may be a protective factor for facets of cognitive impairment. Body fat mass is associated with increased myelin, sex hormones, and leptin, which are all optimal for cognition. Therefore, assessing body composition and combating the loss of body fat mass may prove to be an effective prevention against aspects of cognitive decline in older adults with AMI. Further in-depth analysis is required to discern the relationship between body weight, cognition, and AMI.

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S.D. UCHANI, Y. CONLEY, E.L. FINK, A. WAGNER, K. YEATES, H. TAYLOR, P.M. KOCHANEK & A. TREBLE-BARNA. Brain-Derived Neurotropic Factor (BDNF) Methylation and Brain-Related Clinical Outcomes: A Systematic Review.

Objective: DNA methylation is a key epigenetic mechanism modulating gene expression. Methylation of the brain-derived neurotrophic factor (BDNF) gene may influence brain-related clinical outcomes given BDNF's central role in neuroplasticity. Although BDNF methylation in CNS tissue may be most revealing about brain function, the infeasibility of obtaining such tissue from living patients necessitates proxy sources. We surveyed empirical articles examining BDNF methylation in association with brain-related clinical outcomes.

Participants and Methods: On PubMed, we searched: (Methylation) and (BDNF) and (brain or psychological or psychiatric or cognitive or neurological or stress or adversity or trauma or maltreatment or abuse or neglect). Articles investigating medication were excluded.

Results: Of 352 articles, 53 were included. Articles examined depression (16), adversity (10), Alzheimer's (6), MCI (2), schizophrenia (5), bipolar disorder (5), suicide (5), alcoholism/drug addiction (4), PTSD (2), eating disorders (2), epilepsy (1), neuroticism (1), stroke (1), OCD (1), anxiety (1), borderline personality disorder (1), ADHD (1), Rett syndrome (1), and fibromyalgia (1). Tissues examined were: peripheral blood (37), brain tissue (8), buccal cells/saliva (8), CSF (1), germline cells (1), and placenta (1). BDNF promoters I and IV were the most common methylation targets examined, but there was high variability across studies. Thirty-eight articles reported significant associations between BDNF methylation and outcomes, most commonly for depression (11/16), adversity (8/10), Alzheimer's disease (5/6), and suicide (5/5).

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Conclusions: A wide range of BDNF methylation targets have been investigated in association with brain-related clinical outcomes across a variety of tissue sources. Many studies reported significant associations between BDNF methylation in peripheral tissues and brain-related clinical outcomes, suggesting that BDNF methylation in peripheral tissues may serve as a valuable biomarker for brain function.

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K. WACLAWIK, A. JONES, S. BARBIC, K. GICAS, T. O'CONNOR, O. LEONOVA, A. BARR, R. PROCYSHYN, D. LANG, G. MACEWAN, W. PANENKA, A. YAMAMOTO, W. HONER & A. THORNTON. Premorbid IQ and Neurological Soft Signs Predict Cognitive Impairment in Marginally Housed Youth.

Objective: Homeless and marginally housed youth represent a growing and particularly vulnerable sector of society. They face numerous health challenges including psychiatric illness, substance use and viral infection. An emerging literature indicates that cognition is compromised in homeless youth, but there is limited research examining the risk factors for cognitive impairment.

Participants and Methods: Youth (N = 101; M_{age} = 25.01; 77% male) were recruited from marginal housing sites and assessed for psychiatric illness, viral infection, housing history, neurological soft signs and cognition (memory, inhibition, attention, cognitive flexibility, and premorbid IQ). Candidate predictor variables (premorbid IQ, stimulant or opioid dependence, schizophrenia or schizoaffective, duration of homelessness or marginal housing, soft signs, hepatitis C, herpes simplex) were pre-screened in correlation and included in regression analyses if significant.

Results: Average estimated premorbid IQ was in the normal range (M = 100.78). Memory impairment was associated with lower premorbid IQ (β = .32, $p < .05$), adjusting for duration of marginal housing/homelessness and soft signs, which were not significant. Inhibiton was associated with both lower premorbid IQ and more neurological soft signs (β = .31, β = -.26, $p < .05$). Attention was associated with opioid dependence (β = -.28, $p < .05$).

Conclusions: In this multimorbid sample of marginally housed youth, premorbid IQ and markers of neurodevelopment emerged as the most prominent predictors of cognitive impairment. Unlike in middle-aged or older adult marginally housed samples, most health risks in this youth population did not predict cognition. Estimated premorbid IQ was in the average range. These findings suggest that cognitive compromise may begin early in the homeless lifespan and those with lower premorbid intellectual and neurological functioning may be particularly vulnerable to the early effects of this adverse environment.

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S.S. WILKINS, J. PERKINS, B. MESRAOUA & G. ALARCÓN PALOMO. MoCA Verbal Fluency Scores Lower in Arabic Speakers in Qatar.

Objective: To determine if Arabic speakers in Qatar exhibited decreased MoCA phonemic verbal fluency compared to English speakers.

Participants and Methods: All patients admitted to the Epilepsy Monitoring Unit (EMU) at Hamad General Hospital (HGH) in Doha Qatar were administered the Montreal Cognitive Assessment (MoCA) in their best language as part of their standard clinical care. An exemption was granted by the IRB at HGH. Those with grossly intact MoCA scores (defined as a score of 20 or greater) who spoke Arabic or English were included; 56 Arabic speakers and 18 English.

Results: Arabic speakers were found to have significantly lower phonemic verbal fluency scores than English speakers; Arabic mean/sd was 5.91(3.1), English 10.38 (4.3). The Mann-Whitney-U test for independent samples found a significant effect of language (mean ranks of the Arabic and English groups were 32.03 and 54.53, respectively; U = 197.5, Z = -3.88, p < 0.001, r = 0.45). The effect size (r) was medium bordering on large (0.5 cut-off). No significant difference was found between groups for age, education, memory performance or total MoCA score.

Conclusions: Arabic speaking patients in Qatar obtained significantly lower verbal fluency scores on the MoCA than English speakers; Arabic mean 5.91 and English mean 10.4 words in one minute. It is postulated that reduced phonemic verbal fluency in Arabic may be related to possible linguistic and/or cultural factors. Khalil (2010) also found that phonemic fluency was lower in Arabic than English speakers in Saudi Arabia, and recommended that semantic verbal fluency may be a more valid measure in Arabic speaking populations. Care in interpreting Arabic verbal fluency scores is recommended, particularly phonemic verbal fluency on screening measures such as the MoCA.

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E. YEHENE, Y. ZAKSH, M. ELYASHIV & A. ALTMAN. Locked – in-a Box: The Impact of Caregiver's Loss Perception on Prolonged Grief Reaction in Disorders of Consciousness.

Objective: Persistent Vegetative State (PVS) and Minimally Conscious State (MCS) may occur after severe brain injuries also classified as Disorders of Consciousness (DOC). Family members of a patient with DOC often experience an immense sense of *'Ambiguous Loss'* due to the concurrent *presence and absence* of their loved one. Although studies evidenced high levels of distress and burden among this population, an exploration of the mechanism underlying their open-ended emotional ordeal is essential for developing proper intervention.

Therefore, we sought to characterize the nature of *Ambiguous Loss* experienced by caregivers of DOC patients (CDOC) by examining *Grief Reaction* and its interplay with *Level of Psychological Separateness* (LPS) from the patient; *Frequency of Visits* (FV); *Need for Closure* (NFC); and *Perception of Psychological Presence* (PPP).

Participants and Methods: The sample included 64 primary CDOC diagnosed with PVS (n=49; 76.6%) or MCS (n=15; 23.4%). Mean caregiving duration was 4.9 years (SD=5.1). Participants underwent a structural clinical interview and completed the following questionnaires: *'Boundary Ambiguity Scale'*, the *'Revised Need for Closure Scale'*, and an adapted version of the multi-factor *'Two-Track Bereavement Questionnaire' (TTBQ-Rubin, 1999).*

Results: (1) Grief scores among CDOC did not significantly differ from that exhibited by previously tested samples of bereaved caregivers following the death of a loved one. (2) CDOC experienced grief for prolonged periods, years after the event. (3) Regression analysis and the Bootstrap Estimation indicated that LPS variable has a significant role in mediating the correlation between each independent variable (NFC, FV, PPP) and Grief Reaction. Lower levels of LPS accentuate grief while higher levels mitigate grief.

Conclusions: Therapeutic interventions have to focus on strengthening caregiver's ability to form clearer psychological boundaries (LPS), when a total separation from their loved ones is unattainable.

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M. ZIMMERMAN, E.E. MORAN, C.L. CROOK, J. STIVER, J. WEATHERS, A. PHILI, R. ZIMMERMAN & D. TOTO. Gender Differences in Relationships between Neuropsychological Function and Sleep Variability.

Objective: Compared to older and middle-aged adults, sleep quality in young adults is highly variable from day-to-day. Studies that have examined neuropsychological function in relation to sleep in young adults show equivocal results. The aim of this study was to determine if gender had an impact on relationships between sleep, attention, executive function, and verbal memory.

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Participants and Methods: Participants were recruited in a University in the Bronx, NY. Participants wore actigraphic devices on their non-dominant wrist for » 14 days to measure interdaily stability (IS) of sleep. Participants then underwent neuropsychological testing. Attention, executive function, and verbal memory were measured using the Trail Making Test parts A and B (TMTA & TMTB) and the International Shopping List from the Cogstate computerized testing battery (ISL learning total score, ISL learning slope, ISL recall total score).
Results: 216 participants (mean(sd): age years=20.4(2.0); education years=14.4(1.5)) were included. Age, education, and ethnicity were not significantly associated with sleep or any neuropsychological variables of interest. Men exhibited poorer sleep IS than women (t=-2.03, p=0.04) and performed worse on attention (TMTA; t=2.44, p=0.02) and verbal memory (ISL learning; t=-3.59, p<0.01 & ISL recall; t=-2.96, p<0.01). Linear regression incorporating the interaction (sleep IS x gender) revealed a significant overall model for attention (F(3,133)=6.22,p<0.01) with sleep IS (B=0.33,p=0.01) and sleep IS x gender interaction (B=-0.87, p=0.01) as significant predictors of TMTA performance.
Conclusions: Results showed that young men exhibit highly variable sleep patterns and poorer performance on tests of attention and verbal memory compared to women. Further, gender has a significant impact on the relationship between sleep and attention. These findings may help identify young adults at risk for attentional difficulties as well as inform recommendations for good sleep hygiene and related neuropsychological function.
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C.G. ZUNDEL, R. KILLIANY, B. KOO, M. KRENGEL, R. TOOMEY, J. AJAMA, P. JANULEWICZ, M. ABREU, E. SISSON, T. HEEREN, D. LITTLE, L. STEELE, N. KLIMAS & K. SULLIVAN. Objective Biomarkers of Gulf War Illness: White Matter Microstructural Integrity, Cognition and Blood Markers in Gulf War Veterans.
Objective: Identifying objective biomarkers of Gulf War Illness (GWI) is one focus of the Boston GWI Consortium. GWI symptoms include fatigue, pain and cognitive problems. Our prior magnetic resonance imaging (MRI) and cognitive studies of GW veterans have found reduced brain white matter (WM) volumes and cognitive decrements in GWI veterans. This study correlates cognitive, pain and sleep outcomes with WM microstructural integrity in veterans with GWI and healthy GW veteran controls. Assessments included a full cognitive battery, Pittsburgh Sleep Quality Index, multi-dimensional fatigue scale, McGill and visual-analog pain scales as well as brain imaging of the major WM pathways using diffusion-weighted MRI (DWI) and blood glutamate levels.
Participants and Methods: Participants included 72 GW veterans (59 GWI cases, 13 healthy controls). Cases and controls did not differ by age, sex or education (mean age 50yrs; mean education 15yrs). Brain images were post-processed with Freesurfer software. For each WM pathway, we obtained measures of average Fractional Anisotropy (FA), Axial Diffusivity (AD) and Mean Diffusivity (MD).
Results: ANCOVA volumetric comparisons showed significantly lower total cortex, precentral gyrus, caudal middle frontal gyrus, rostral middle frontal gyrus, superior frontal and superior longitudinal fasciculus (SLF) volumes in GWI cases vs. controls (all p<0.05). WM microstructural integrity decrements (FA, AD, MD) in GWI cases were found in SLF-parietal and SLF-temporal endings, inferior longitudinal fasciculus, corpus callosum and anterior thalamic radiations (p<0.05). WM changes were significantly correlated with poorer cognitive performance (CPT3, Trails B, DKEFS, Finger Tap Test) as well as reduced sleep quality, increased fatigue, pain severity and higher glutamate levels in GWI cases (all p<0.05).
Conclusions: Results show that WM changes are an integral part of GWI pathobiology and behavioral outcomes that should be further validated.
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C.G. ZUNDEL, M. YEE, A. MAULE, C.M. GRASSO, K. SULLIVAN & M. KRENGEL. Health Symptoms Associated with Gulf War-Specific Exposures in Male and Female Veterans: A Longitudinal Assessment.
Objective: 1991 Gulf War (GW) Veterans were exposed to a combination of hazardous chemicals while deployed. These exposures have been linked to several adverse health and cognitive outcomes, including memory impairment, fatigue, pain syndromes, and gastrointestinal dysfunction. Using a subset of the Fort Devens Cohort (FDC), this study examines the relation between exposures and self-reported health symptoms, over a follow-up period of seven years.
Participants and Methods: Deployed GW-veterans were surveyed at several time points between 1990-1997. 117 (58 women) survey participants who completed three survey time points were included in these analyses. Repeated logistic regression models stratified by sex were used to examine the association of GW-specific exposures and health symptoms over time.
Results: Men and women endorsed GW hazards at a high frequency. Specifically, men exposed to debris from SCUD missiles had increased odds of anxiety (OR=2.62, CI: 1.17-5.86), trouble sleeping (OR=2.64, CI: 1.10-6.35), dizziness (OR=2.41, CI: 1.03-5.66) and muscle twitching (OR=5.02, CI: 2.05-12.31) compared to unexposed men, over time. Women exposed to debris from SCUD missiles had higher odds of crying easily (OR=4.32, CI:1.90-9.84), anxiety (OR=3.05, CI: 1.30-7.15), trouble sleeping (OR=2.74, CI: 1.28-5.86), and fatigue (OR=2.94, CI: 1.21-7.18), compared to unexposed women, over time.
Conclusions: In men and women, specific GW exposures were associated with significantly higher odds of symptom reporting, over time. The differences between men and women in the profile of symptoms associated with the same GW exposures highlight the need for more deployment health research focusing on sex-specific issues.
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Movement and Movement Disorders

K.M. ANDERSON, A. ROSSETTI, E. FURR-STIMMING & N. PESSOA ROCHA. The Impact of Demographic Factors and Quality of Life (QoL) on Cognitive Change in Huntington's Disease (HD).
Objective: *Objective*: Cognitive decline has been shown to negatively affect the quality of life (QoL) in individuals with HD. However, it is unclear if this is a bidirectional relationship. Understanding demographic factors and QoL among individuals with HD is relevant to identify interactions between overall well-being and disease course. The goal of the current study is to understand the influence of demographic and quality of life factors on cognitive change in HD.
Participants and Methods: *Participants and Methods*: This longitudinal study was conducted with data from 730 participants from the Enroll-HD database with pre-manifest and manifest HD gene carriers in North America. A composite cognitive change score was calculated for each participant from the Symbol Digit Modalities Test (SDMT), Stroop Color Word Test, and Trail Making Test. A hierarchical multiple regression was performed to determine if the addition of demographic factors (marital status, education, area of residence, and employment status) and QoL (Short-Form Health Survey (SF-12)) improved the prediction of cognitive change beyond age, CAG-repeat length, disease status (pre-manifest versus manifest), and depression (Problem Behaviors Assessment-Short (PBA-s)).

Results: *Results*: The addition of demographic factors to the prediction of cognitive change did not lead to a statistically significant increase relative to age, CAG-repeat length, disease status, and depression alone, R^2 of 0.02, $F(5, 720)=0.627$, $p>0.05$. However, worse QoL was related to cognitive decline, as the addition of QoL to the model led to a statistically significant increase in R^2 ($R^2= 0.029$, $F(2, 718)=3.450$, $p=0.03$). Only the physical component of QoL had a significant influence on cognitive change ($B=-0.003$, $t= -2.626$, $p=0.009$).
Conclusions: *Conclusions*: Results suggest that QoL at baseline predicts cognitive decline in individuals with HD. QoL, as related to physical functioning, may be an important factor to consider in preventative therapeutic interventions for cognitive change in HD.
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A.E. CABRERA TUAZON, C.F. PLUIM, E. PIROGOVSKY-TURK, N. WHITELEY, M. NAKHLA, J. FILOTEO, S. LESSIG, I. LITVAN & D. SCHIEHSER. Apathy Predicts Cognitive Decline in Individuals with Parkinson's Disease.
Objective: Previous research has shown that depression predicts future cognitive decline in PD. Recent research has also shown that depression in PD presents atypically with more prominent secondary symptoms, such as apathy and fatigue. This current study sought to examine which subcomponents of depression best predict future cognitive decline in PD.
Participants and Methods: Non-demented individuals with PD (n=118) were administered a self-report measure of depression (Geriatric Depression Scale; GDS) that has previously been shown to be sensitive to cognitive decline in PD and a comprehensive neuropsychological battery at baseline and at a 2-year follow-up (T2). Linear regressions were conducted to examine the relationships between baseline GDS total score and factor-analytic derived GDS subscales of Apathy, Fatigue, and Anxiety with T2 cognitive composite scores representing Attention, Learning, Delayed Recall, Language, Visuospatial Function, and Executive Function.
Results: Controlling for baseline cognition and demographic characteristics, higher levels of baseline apathy (GDS Apathy subscale) significantly predicted worse learning (p = .011) and language abilities (p = .016) at T2; no other GDS subscales were related to T2 cognition. Overall baseline depression (GDS total score) failed to significantly predict future cognition, although trends were noted for predicting T2 learning (P = .068) and language scores (p = .092).
Conclusions: The apathy subscale of the GDS significantly predicted future decline in learning and language. Results imply that apathy, which is similar, yet dissociable from depression, may be a better indicator than depression of future cognitive decline in learning and language in PD. Future research into the neural underpinnings of the unique relationship between apathy and cognitive decline in PD is warranted. This study also highlights the importance of screening and treating apathy to improve mental and cognitive health in PD.
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E. BAYRAM, S.J. BANKS & J.Z. K. CALDWELL. Sex Effect on Verbal Learning, Memory and Visuospatial Functioning in Parkinson's Disease.
Objective: Cognitive impairment is a common symptom in Parkinson's disease (PD). Although effects of sex on PD motor symptoms are consistent, data regarding sex effects on cognition in PD are inconsistent. Scarce data suggest that women with PD perform better on verbal learning and memory, while men are better in visuospatial functioning. We aimed to investigate whether sex effects on these cognitive domains in PD differ from those in a healthy population.
Participants and Methods: 166 PD (55 female, 33.1%), 109 PD-MCI (PD with mild cognitive impairment) (34 female, 31.2%), and 125 cognitively normal controls (CNC) (51 female, 40.8%) from the Parkinson's Progression Markers Initiative. Patients were classified as PD or PD-MCI based on Level I criteria for PD-MCI. All participants had four years of data for Hopkins Verbal Learning Test- Revised (HVLT-R) and Benton Judgment of Line Orientation (JoLO). Main and interaction effects of sex, disease, and time on longitudinal scores and on change from baseline to year four were analyzed. Age and years of education were covaried.
Results: Sex and disease had main effects on all scores. Females showed better verbal learning and memory and worse visuospatial functioning compared to men. PD-MCI individuals had lower scores on learning and memory compared to individuals with PD and CNC; and lower scores on JoLO compared to individuals with PD. There was no significant interaction between any factors. HVLT-R total learning score declined significantly more in the PD compared to the PD-MCI, without any significant main effect of, or interaction with, sex.
Conclusions: Similar to healthy controls, women with PD and PD-MCI were better in verbal learning and memory, and worse in visuospatial functioning compared to men in their respective diagnostic groups. These differences were not disease-specific but rather a general sex effect.
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H.L. COMBS, A. STRUTT, J. JIMENEZ-SHAHED, N. NIEMANN, A. VISWANATHAN & M. YORK. Cognitive and Neuropsychiatric Correlates of Impulse Control Disorder Symptom Severity in Parkinson's Disease.
Objective: Impulse control disorders (ICD) are a group of behaviors characterized by a failure to resist an impulse or drive to perform an action despite negative effects, including gambling, hypersexuality, binge-eating, and compulsive shopping. It is an increasingly recognized complication in Parkinson's disease (PD) and affects up to 6-14% of PD patients. ICDs have traditionally been examined as a dichotomous construct; however, the development of the Questionnaire for Impulsive-Compulsive Disorders in Parkinson's disease Rating Scale (QUIP-RS), allows for measurement of symptom severity. The present study sought to investigate the cognitive and psychiatric correlates of ICD symptom severity in PD patients.
Participants and Methods: 34 patients with idiopathic PD (M_{age} = 60.4, 76.5% male) underwent a comprehensive neuropsychological evaluation including the QUIP-RS along with other measures of impulsivity and distress as part of a pre-surgical evaluation for deep brain stimulation (DBS).
Results: 29% met criteria for an ICD at the time of the initial evaluation, of which 50% were prescribed a dopamine agonist. Patients with ICD had significantly lower estimated premorbid intelligence, lower education, and were more depressed and impulsive. There were no significant differences on neuropsychological measures, disease severity, or medication (i.e., LEDD) between patients with and without ICDs. Greater ICD symptom severity was related to lower education, lower premorbid intelligence, greater depressive symptoms, worse anxiety, greater impulsivity, difficulties with activities of daily living, more neurobehavioral problems, and more familial distress.
Conclusions: The present study found higher rates of ICDs than have been reported previously suggesting the rate of ICD may inherently be higher in samples undergoing DBS. Although research has focused on ICD group differences, the present study demonstrated the utility of treating the condition as a spectrum to uncover potential relationships that may be otherwise masked.
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S.J. CROWLEY, P. ZEBLISKY, J.J. TANNER, M. DING & C. PRICE. Differences in Basal Nucleus of Meynert Resting State Connectivity Between Statistically-Derived Cognitive Subtypes of Parkinson's Disease.

Objective: Individuals with Parkinson's disease (PD) present with varying cognitive deficits across several domains. Prior studies used data-driven approaches to create cognitive subtypes of PD, but the underlying physiological differences between PD subtypes is unclear. One region which may account for some of this variability is the basal nucleus of Meynert (BNM), which is affected by Lewy body pathology and was shown to predict cognitive decline at 18 months. To determine the functional role of the BNM in cognitive variability in PD, we compared resting state functional connectivity of the BNM between PD cognitive subtypes.

Participants and Methods: 101 individuals (75 PD; 26 Non-PD) completed neuropsychological testing and resting state fMRI (Siemens 3T Verio) as part of a federally funded investigation (NIH/NINDS R01-NS-082386). Inclusion criteria: no dementia, no stroke history, no other neurodegenerative disorder, and education >8 years. Cognitive phenotypes were determined with a k-means cluster analysis with seven executive functioning and memory measures. Voxelwise BOLD activity was calculated with bilateral BNM as a seed. Connectivity was compared between phenotypes controlling for age and sex (voxel threshold: p<.001 uncorrected; cluster threshold: p<.05 FDR corrected).

Results: Analyses identified three PD phenotypes: Low Executive (LE; n=16), Low Memory (LM; n=21), and Cognitively Well (CW; n=38). Relative to CW, 1) LE had higher connectivity between BNM and bilateral superior frontal gyrus and bilateral frontal pole, and 2) LM had higher connectivity in bilateral superior frontal gyrus and right frontal pole at a more liberal voxel significance threshold (p<.002). CW had higher connectivity than non-PD in left superior frontal gyrus and left precentral gyrus.

Conclusions: Both LE and LM individuals with PD showed higher connectivity between BNM and regions of superior frontal gyrus. Regardless of type of PD cognitive phenotype there appears to be increased coupling between BNM and frontal regions.

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Y.A. EHRLICH, A.M. JACOB, L.E. COLVIN & P.J. MATTIS. Predictors of cognitive change in deep brain stimulation for individuals with Parkinson's disease.

Objective: Deep Brain Stimulation (DBS) is a common treatment for the motor symptoms associated with Parkinson's disease (PD), and it is not recognized to affect cognition. However, cognitive changes after DBS treatment are documented in a subset of patients. The factors that predict cognitive variability in treatment response remain unknown. The aim of the current investigation was to identify treatment responders and examine such predictors. A second goal was to explore cognitive differences among responder groups both on and off DBS.

Participants and Methods: Twenty unmedicated adults with PD (M_{age} = 59.25, SD_{age} = 10.98) underwent neuropsychological evaluation on and off DBS. In accordance with our prior research, verbal learning was used to classify participants who responded positively (n = 8), negatively (n = 7), and not at all (n = 5) to DBS treatment using an RCI-derived clinical cut-off. Individual differences and neurocognitive performances were assessed in relation to treatment response and DBS status.

Results: Analyses revealed that verbal learning (HVLT trial sum) was predictive of DBS treatment response. Positive responders demonstrated worse verbal learning at baseline relative to the negative and non-responders (p = .03). Further, positive responders performed better on recognition discriminability and delayed recall of verbal information (HVLT) on DBS (p = .011, trending p = .089, respectively), while negative and non-responders showed no neurocognitive changes as a function of DBS.

Conclusions: Cognitive benefits from DBS are most notable for individuals who demonstrate relative impairment at baseline. This study identifies the importance of verbal learning as a predictor of cognitive response to DBS treatment and highlights the potential utility of DBS in improving verbal memory for a subset of PD patients.

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L. GRENKO & S. ROGERS. ROCF: A Measure of Visuospatial and Executive Abilities in Patients with PD.

Objective: Poor visuospatial performance is a marker for cognitive impairment in Parkinson's disease (PD). However, there is some uncertainty as to whether poor performance on the Rey-Osterrieth Complex Figure Test (ROCF) is due to impaired visuospatial functioning or impaired executive abilities. The present study seeks to elucidate the relationship between performance on the ROCF and both executive and visuospatial functioning in patients with PD.

Participants and Methods: A total of 129 patients diagnosed with PD participated in neuropsychological assessment. Executive functioning was evaluated using WAIS-IV Arithmetic, Letter-Number Sequencing, and Similarities, as well as Trails B, DKEFS Inhibition, and COWAT FAS. In addition to the ROCF Copy, visuospatial functioning was assessed through WAIS-IV Picture Completion.

Results: There were significant positive correlations between ROCF performance and all executive tasks (all rs > .33, ps <.01). PD patients with impaired (< 1.5 standard deviations below norms) ROCF performance also scored significantly worse on all executive measures than those without impairment (all ts > 2.51, ps <.02), even controlling for gross cognitive functioning (Fs > 4.28, ps <.05). Using a r-to Fisher's $-z$ transformation, the correlation between ROCF and visual perception was not significantly different than the correlations between ROCF and each frontal-executive measure.

Conclusions: The ROCF may equally capture executive and visuospatial abilities of PD patients. ROCF performance was positively correlated with all frontal-executive abilities, and PD patients with ROCF deficits showed significantly worse frontal-executive scores relative to those without ROCF deficits. This effect was present even when eliminating global cognitive impairment as a mediating factor. However, the relationships between ROCF and both visuospatial and executive abilities were not significantly different. This suggests both executive and visuospatial declines in patients with PD are inextricably captured by the ROCF.

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L.P. HIZEL, S.J. CROWLEY, C. DION, C. HARDCASTLE, M.E. WIGGINS, J.J. TANNER, M. NUR, R. DAVIS, D. PENNEY, D.J. LIBON & C. PRICE. Non-Demented PD Cognitive Phenotypes Differ on Clock Drawing Time to Completion and Clock Size.

Objective: Command and copy conditions of the digital Clock Drawing Task (dCDT) require several cognitive functions. We hypothesized PD cognitive phenotypes would differ on two digital measures of dCDT copy and command conditions. PD individuals with low executive (LE) abilities were expected to perform slower than other cognitive phenotypes on a speeded switching measure, post clockface latency (PCFL), across conditions. We explored differences between PD cognitive phenotypes for command and copy clockface area (CFA).

Participants and Methods: 107 participants with idiopathic non-demented Parkinson's disease (PD) and 57 non-PD participants completed CDT using a digital tool capturing nuanced behavior as well as other cognitive measures. Cognitive phenotyping was determined using cluster analyses on measures of memory and executive functioning. Factor loadings for each participant were used in a subsequent k-means analysis with 3 clusters to determine PD phenotypes. Data were normalized as needed. ANOVA analyses controlling for age, education, and disease duration examined differences on PCFL and CFA for both conditions, with follow-up Bonferroni corrected post-hoc analyses.

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Results: Cluster analyses identified three PD cognitive phenotypes [23 LE; 30 low memory (LM), 54 cognitively well (CW)]. After covariate correction, PD cognitive phenotypes on command differed on PCFL [F(2,104)=3.04, p=.05] and CFA [F(2,104)=3.00, p=.05] such that LE was slower than CW [t(73)=2.55, p=.035] and LE produced the smallest clocks [all p<.01]. Phenotypes trended toward significance on PCFL and CFA for copy. The CW and non-PD groups were not significantly different on either measure in either condition.
Conclusions: PD individuals with reduced executive function were slower to produce clocks and also produced smaller clocks relative to PD peers with memory weaknesses or PD without cognitive weaknesses. Subtle behaviors revealed by digital technologies can provide insight into PD non-demented cognitive phenotypes.
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A.M. JACOB, Y.A. EHRLICH, L.E. COLVIN & P.J. MATTIS. The COMT Val^{158}Met Polymorphism in Learning for Individuals with Parkinson's Disease On and Off Levodopa.
Objective: The Val^{158}Met polymorphism in the catechol-O-methyltransferase (*COMT*) gene has been shown to modulate dopamine in the prefrontal cortex. Specifically, Met allele carriers are shown to have greater dopaminergic availability, and in turn, better learning performance compared to those with Val/Val genotype. This relationship was shown to be reversed in individuals with Parkinson's disease (PD). However, this finding may have reflected an "overdosing" of the dopaminergic system, as recent investigation revealed that PD patients demonstrated a similar trend as controls (i.e., stronger learning with Met allele expression) when off L-DOPA. The current study aimed to assess PD patients on and off L-DOPA to determine whether the presence of a dopaminergic agent interacts with COMT to affect learning.
Participants and Methods: Thirty-six adults with PD (M_{age} = 60.31, SD_{age} = 8.27; n = 24 Met/Met and Val/Met; n = 12 Val/Val) underwent neuropsychological assessment on and off L-DOPA. Verbal (HVLT/CVLT-2 sum, standardized) and non-verbal (BVMT-R sum) learning were cognitive variables of interest.
Results: Analyses revealed that subjects performed better on non-verbal learning on L-DOPA, regardless of genotype (p = .003); however, there were no significant differences between COMT groups in learning performance. Verbal learning did not differ based on genotype, medication status, or their interaction.
Conclusions: PD patients performed better on measures of non-verbal learning on L-DOPA; the same effect was not seen in verbal learning. Contrary to prior research, there were no genotype group differences in learning as a function of levodopa, despite the strength of a repeat analysis. Lack of findings may reflect reduced power due to small sample size. Additionally, the relationships among dopaminergic agents, cognition, and genotypic determinants of dopamine availability may be modulated by other factors (e.g., duration/progression of illness, comorbidity, baseline cognitive heterogeneity) to be assessed in future investigations.
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I. JÄRVINEN, S. IMMONEN, N. SCHIAVONE, E.A. LEHTO, M. VIRTA, J. LIPSANEN, K. MICHELSSON, J. LAUNES & L. HOKKANEN. Association of IQ with Coordination Problems from Childhood to Midlife. A 40-year Cohort Study.
Objective: Coordination problems afflict 5–20% of children. Their cause is inadequately understood but they can be related to perinatal medical problems. Coordination problems are associated with cognitive problems in children, including a lower IQ compared to healthy controls. The difference in IQ has been reported to persist into late adolescence, but, to the best of our knowledge, no longer-term follow-up has been conducted. Our study aimed to determine whether the difference in IQ persists from childhood to midlife.
Participants and Methods: As part of a prospective cohort study, we studied 662 participants exposed to perinatal risks and 128 controls. A follow-up was conducted at age 9 and the participants' coordination skills examined with Stott's Test of Motor Impairment: no coordination problems were detected in 445 participants, 123 had moderate problems, and 65 marked problems. Also at age 9, their IQ was measured with WISC. At age 40, their IQ was measured again, with WAIS-IV.
Results: A linear mixed effects model was fitted to analyze the effects on IQ of the level of coordination problems, exposure to perinatal risks, and age. IQ differed significantly between the coordination problem groups when the other effects were controlled for, $F(2, 729.06) = 8.37$, $p < .001$. In Bonferroni-Holm-corrected pairwise comparisons, those with marked problems had a lower IQ than those with no coordination problems, $p < .001$, Cohen's $d = -.66$ No other pairwise comparisons were significant. The participants exposed to perinatal risks had a lower IQ than controls, $F(1, 732.37) = 11.19$, $p = .001$, Cohen's $d = -.42$. IQ, on average, did not significantly change from childhood to midlife, and no interactions were significant.
Conclusions: On average, people with coordination problems have a lower IQ than healthy controls from childhood to midlife. The average difference corresponds to 10 IQ points.
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N. KURNIADI & J. JONES. Two-Year Longitudinal Neuropsychological Test Performance between SWEDD, Dopamine Deficient Parkinson's Disease, and Healthy Controls.
Objective: It remains unknown whether the term 'scans without evidence of dopaminergic deficit' (SWEDD) represents a possible misdiagnosis, early stage, or subtype of Parkinson's disease (PD). The majority of studies examining cognitive performance between SWEDD, dopamine deficient PD, and healthy controls (HC) have relied on cognitive screens and have been cross-sectional in nature. This is the first study comparing neuropsychological test performance between SWEDD, PD, and HC over a two-year period.
Participants and Methods: Neurocognitive test data of 57 SWEDD, 367 PD, and 185 HC from the Parkinson's Progression Marker Initiative were retrospectively analyzed. Participants completed cognitive tests of processing speed, learning and memory, semantic fluency, working memory, and visuospatial abilities. Multi-level models examined longitudinal differences in cognitive performance between groups, controlling for age, education, gender and disease severity.
Results: Analyses revealed that both the SWEDD and PD group performed worse than the control group on tests of verbal learning, verbal delayed free recall, animal fluency and processing speed (all $p$values < 0.05). The SWEDD and PD groups did not significantly differ on any cognitive tests.
Conclusions: Disruption of similar neural circuits may underlie cognitive deficits in SWEDD and dopamine deficient PD. Comparable cognitive decline between SWEDD and PD may suggest that SWEDD is not a misdiagnosis of individuals with PD despite normal dopaminergic imaging.
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N. KURNIADI & J. JONES. Longitudinal Differences in Impulse Control Disorders between SWEDD, PD, and Healthy Controls.
Objective: Previous research suggests that reduced dopamine transporter (DAT) is a biomarker for impulse control disorders (ICDs) among individuals with Parkinson's disease (PD). However, some individuals with PD show scans without evidence of dopaminergic deficit (SWEDD),

calling into question whether rates of ICDs differ between SWEDD and dopamine deficient PD. This is the first study to examine ICD prevalence between PD, SWEDD, and healthy controls over a three-year period.
Participants and Methods: Data were obtained from 367 individuals newly diagnosed with PD (with evidence of dopamine deficiency), 57 SWEDD patients, and 185 HC. SWEDD participants were identified with dopamine transport imaging. Impulse control disorders, and motor severity were assessed at baseline and two annual assessments. Multi-level models examined longitudinal differences in the number of ICD symptoms between groups, controlling for age, gender and disease severity.
Results: Analyses revealed that individuals in the SWEDD group reported a greater number of ICD symptoms, relative to both the PD ($p < 0.001$) and control ($p = 0.003$) groups, across the three annual assessments.
Conclusions: The present findings are consistent with previous research that found greater rates of non-motor symptoms in SWEDD compared to PD. It is possible that neurobiological factors other than dopamine loss contribute to ICD in SWEDD over time. Thus, SWEDD may represent a distinctly different phenotype than dopamine deficient PD. Notably, we did not control for dopamine replacement therapy in the current study. Much more research is needed to clarify the neural circuits underlying ICD in SWEDD and PD.
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F.V. LOPEZ, E. TRIFILIO, B.Y. ROHL, S. PANDYA, J. BELSER-EHRLICH, H. FERNANDO, B. SCOTT, N. MCFARLAND & D. BOWERS. Subjective Cognitive Impairment Not Attributed to Mood in Parkinson's disease: Evidence from the University of Florida-Cognitive Function Questionnaire.
Objective: Evaluation of subjective cognitive impairment (SCI) and objective cognitive performance may elucidate a patient's awareness to current cognitive status and/or decline. Empirical evidence, however, is lacking for SCI measures in Parkinson's disease (PD). The SCI task force recommends such measures must maximally exclude mood as a causative factor. Therefore, the primary aim of the current study was to examine the cognitive and mood correlates of this new multidomain scale, the University of Florida-Cognitive Function Questionnaire (UF-CFQ).
Participants and Methods: The overall sample (n=90) was predominately male, highly educated, and in the early-mid stages of the disease. To identify SCI clusters, PD participant responses on the UF-CFQ were subjected to a hierarchical cluster analysis using Furthest neighbor method and squared Euclidean distance. Point-biserial correlations were performed on SCI symptom clusters with disease characteristics, mood/apathy, and cognitive measures of processing speed (Stroop-Color), working memory (Letter Number Sequencing; LNS), recent memory (HVLT-Delay), visuospatial (Judgement Line of Orientation; JOLO), and executive function (Animal Fluency).
Results: Two SCI symptoms clusters were identified: high or low reported SCI. Correlation analyses indicated that high SCI was associated with significantly poorer performance on LNS, HVLT-Delay, JOLO, and Animal Fluency ($ps < .05$). At the trend level, high reported SCI was related to greater reported apathy symptoms. No other significant relationships were found.
Conclusions: The UF-CFQ provides preliminary evidence for high and low SCI subgroups in PD. The cognitive profiles in these subgroups suggest differences in cognitive presentation but a lack of association with mood (i.e., depression or anxiety) with possible exception of apathy.
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K.D. MAHDAVI & S. ROGERS. Surveying the Moderating Effects of Antidepressants on Cognition Among Parkinson's Patients.
Objective: Many patients with Parkinson's disease (PD) suffer from motor difficulties, cognitive declines, and symptoms of depression. Depressive symptoms often have compounding effects on patients' cognitive abilities, but there is a lack of research pertaining to antidepressant medication and cognition in this population. This study investigates the differences in cognition between patients with PD who are taking antidepressants and those who are not.
Participants and Methods: 129 participants (39 women, *M* age = 73.67, *M* education = 15.49) completed a comprehensive neuropsychological battery, which included subtests of the WAIS-IV, WMS-IV, DKEFS, COWAT FAS and Animals, BNT, Trailmaking A and B, ROCF, HVLT-R, and BVMT-R. State depression was evaluated through the GDS, and responses were divided into Adams' five factors of depression (e.g., dysphoria, hopelessness, apathy, cognitive, and anxiety; 2004).
Results: PD patients who were taking antidepressants performed significantly better than those not taking medications on tests for graphomotor speed (WAIS-IV Coding), language processing speed (DKEFS Color Naming & Word Reading), nonverbal memory (BVMT-R Delayed Recall), and verbal memory (HVLT-R Delayed Recall), $ps < .05$. There were also trends, although insignificant, demonstrating better scores for visuospatial construction (WAIS-IV Block Design) and working memory (WAIS-IV Letter-Number Sequencing), $ps < .08$, among PD patients who were taking antidepressants.
Conclusions: Results evinced several cognitive benefits for PD patients who were taking antidepressant medication, including better processing speed and both verbal and nonverbal delayed recall. There also appears to be a benefit to working memory and visuospatial construction. Patients with depressive symptoms and reduced cognitive abilities in these domains should consider antidepressant intervention. Conversely, patients who perform relatively well in these domains could profit from nonpharmacological forms of treatment, such as psychotherapy.
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E.E. MORAN, B.H. KOPELL & C.A. PALMESE. Cultural Disparity in Antidepressant Use in Presurgical DBS Patients with Parkinson's Disease and Essential Tremor.
Objective: Racial and ethnic disparities in healthcare are well documented, and several studies have identified disparities in diagnosis and management of medical disorders, primarily focusing on differences in African American and Caucasian patients. The aim of this study is to assess depression and mood management among linguistic minority patients who presented for neuropsychological assessment for presurgical workup for deep brain stimulation (DBS) for PD and ET.
Participants and Methods: We conducted a retrospective chart review of 92 individuals (mean age 63.12 years, SD=9.63, 34 % female) seen for presurgical DBS neuropsychological exam for PD and ET. Demographic and clinical information including age of disease onset, age at diagnosis, medications, and depression were collected.
Results: Data for 92 individuals (60 English speaking) were included for analysis. Independent samples t-tests indicated no significant differences between the English speaking group and the linguistic minority group in terms of current age (p=0.53), age of disease onset (p=0.96), or age of diagnosis (p=0.76). The English speaking group had significantly longer disease duration (mean 12.40 years, SD=5.47) than the linguistic minority group (mean=9.68 years, SD=4.55), t=2.36, p=0.021, and reported taking a significantly greater number of overall medications (mean=7.38, SD=3.40) than the linguistic minority group (mean=5.09, SD=2.53), t=83.10, p=0.001. Chi square analyses indicate no significant differences in presence or severity of anxiety (p>0.05) or depression (p>0.05) between groups based on objective inventory, yet the linguistic minority group was significantly less likely to be prescribed a psychiatric medication (p=0.025).

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Conclusions: Differences may exist in medication management of mood symptoms in linguistic minority patients with PD and ET. While depression is common in these populations, linguistic minority DBS patients are disproportionately treated for it, possibly due to symptom underreporting associated with cultural factors.

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M.Z. NAKHLA, C.F. PLUIM, Z.Z. ZLATAR, J. FILOTEO, A.E. CABRERA TUAZON, N. WHITELEY, S. LESSIG, I. LITVAN & D. SCHIEHSER. Attention Abilities Best Predict Medication Management in Parkinson's Disease.

Objective: Individuals with Parkinson's disease (PD) frequently experience cognitive difficulties, even in the absence of dementia. However, there is limited literature exploring the impact of cognition on performance-based function, such as medication management, in these individuals. The purpose of this study was to investigate the relationship between specific cognitive abilities and medication management in a sample of non-demented PD patients.

Participants and Methods: 162 non-demented PD patients were administered a comprehensive neuropsychological test battery, including mood (Geriatric Depression Scale), and medication management (Medication Management Abilities Assessment; MMAA) measures. Composite scores were created from a detailed neuropsychological battery for five cognitive domains: [1] memory, [2] language, [3] executive function, [4] attention, and [5] visuospatial function. Correlations and follow-up hierarchical regressions were conducted to evaluate the associations between MMAA and cognition while controlling for mood and demographic characteristics.

Results: Better medication management was significantly associated with greater performance in executive function, memory, attention, and language (all p's < .04), but not visuospatial function (p = .539). In follow-up regression models, only attention significantly predicted medication management (p = .004) after adjustment for demographics, mood, and all other cognitive performances.

Conclusions: Findings suggest that attention, above and beyond other cognitive abilities and mood symptoms, is critical for adequate medication management in non-demented PD. These results suggest that assessment of attentional abilities should be conducted to help identify those PD patients who may be at risk for medication mismanagement. Furthermore, findings have implications for the implementation of attention-based interventions for the enhancement of treatment compliance in non-demented PD.

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K. PETTERSON. How to Address Unexplained Neurological Symptoms? A study of Danish Terminology and Offence.

Objective: Through the history of neurology and psychiatry a collection of diagnostic terms has accumulated to address neurological symptoms that are unexplained by disease. Some terms can be perceived as offensive especially those indicating that the cause of symptoms is mental illness. The aim of this study was to clarify the degree to which specific diagnostic terms can cause offence in Danish.

Participants and Methods: Participants were recruited from outpatient waiting rooms at the Department of Neurology, University Copenhagen Hospital, Denmark. They were patients, family members, friends and carers. The questionnaire introduced a hypothetical situation of unexplained leg weakness, participants were then asked to express their understanding of 10 diagnostic terms by choosing one or more of 4 different meanings for each term. Offence-scores and "number needed to offend" (NNO) were calculated.

Results: An analysis based on this self-report study suggests that some terms used to address unexplained neurological symptoms in Danish are indeed perceived as more offensive than others. The least and most offensive terms are identified and discussed.

Conclusions: This overview of terminology highlights the risk of offence when addressing unexplained neurological symptoms. Hopefully, this can lead to improvements in the communication between health professionals and their patients. Better use of terminology may also facilitate tasks that are often carried out by clinical neuropsychologists such as supplementary assessment, counselling and treatment.

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C.F. PLUIM, N. WHITELEY, A.E. CABRERA TUAZON, M. NAKHLA, T. MCMANN, R. MOORE, I. LITVAN, S. LESSIG, J. FILOTEO & D. SCHIEHSER. Do Subjective Complaints of Dysexecutive Behavior Predict Future Neuropsychological Test Performance in Parkinson's Disease?

Objective: Cognitive complaints and objectively-measured cognitive deficits, particularly in executive function, are prevalent in Parkinson's disease (PD). Research is mixed regarding the relationship between these subjective complaints and objective cognitive performance, and little is known about these relationships longitudinally in PD. Therefore, we investigated whether baseline subjective reports of executive dysfunction (ED) and disinhibition (DI) predict future cognitive functioning.

Participants and Methods: Seventy-six non-demented PD patients completed comprehensive neuropsychological exams approximately two years apart. Frontal Systems Behavior Scale (FrSBe) T-scores were used as subjective reports of ED and DI at baseline, and composite scores were created for five cognitive domains: executive function, visuospatial, attention, delayed recall, and learning. Adjusting for baseline cognitive status, mood, and demographics, hierarchical regressions were conducted to determine whether subjective ED or DI predicted future neuropsychological test performance.

Results: Baseline subjective ED (p=.045) and DI (p=.005) predicted worse executive function performance at follow-up. In addition, subjective baseline DI predicted (p = .002), while ED trend predicted (p <.07), worse future objective visuospatial performance. Moreover, baseline subjective ED significantly predicted worse delayed recall (p=.026) at follow-up, while DI did not (p=.23). Neither predicted attention or learning.

Conclusions: Findings demonstrate that baseline subjective complaints of dysexecutive behavior predict future cognitive functioning. Specifically, subjective complaints of ED and DI are harbingers of decrements in executive function as well as other cognitive abilities, including memory and visuospatial function. Evaluating patients' subjective complaints, particularly in regard to ED and DI, could help identify patients at risk for these cognitive deficits, and guide targeted and preventative treatment of such deficits.

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G.A. ROBINSON & A. CESLIS. Fluency in Amyotrophic Lateral Sclerosis: Is There a Difference Between Words and Actions?

Objective: Verbal fluency deficits are consistently reported in amyotrophic lateral sclerosis (ALS). This study aimed to investigate whether this was specific to word fluency or reflected a broader intrinsic response generation impairment. In particular, is any impairment specific to verbal fluency or does it encompass actions. Further, is any reduction due to the initiation or sustaining of response generation?

Participants and Methods: Patients with ALS (n = 21) and closely matched healthy controls (n = 21), completed a series of verbal and non-verbal fluency tasks (phonemic/semantic words, designs, actions) and cognitive baseline tests that assess intellectual abilities, memory, language, attention and executive functioning.

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Results: Controlling for spontaneous speech rate, ALS patients and controls were compared on verbal fluency tasks and similarly on non-verbal fluency tasks. Productivity in both the 'initial' and late 'sustaining' time periods were analysed for each fluency task. The results showed that for verbal fluency tasks once spontaneous speech rate is controlled, ALS patients were only reduced for phonemic word fluency, and this was due to difficulty sustaining but not initiating responses. For nonverbal fluency tasks, only action fluency was impaired and this was specific to production of meaningful rather than meaningless gestures.
Conclusions: The pattern of results suggests that both domain (verbal/nonverbal) and other cognitive process including action semantics are important for intrinsic response generation in ALS.
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S. ROGERS & K. ARRIARAN. Anxiety or Depression: Which has a Greater Cognitive Impact in Parkinson's Disease?
Objective: Both anxiety and depression are common psychiatric sequelae to Parkinson's disease (PD). Each also has an impact on the cognitive functions of those with PD, but many clinicians do not make distinctions in the cognitive profiles between Parkinson's patients who have depression and those with anxiety. The present study seeks to determine similarities and differences in the relationship between cognition and both anxiety and depression in PD.
Participants and Methods: A total of 129 patients diagnosed with PD participated in neuropsychological assessment. State depression and anxiety were evaluated through the GDS and BAI, respectively. Cognitive measures administered included subtests of the WAIS-IV, WMS-IV, DKEFS, COWAT FAS and Animals, BNT, Trailmaking A and B, ROCF, HVLT-R, and BVMT-R.
Results: There were significant negative correlations between BAI scores and WAIS-IV Digit Span, Arithmetic, Coding, Block Design, & Completion, Trails A & B, DKEFS Inhibition, and ROCF 30′, all *r*s > -.18, *p*s <.05. Scores on the GDS were negatively associated with Trails A, DKEFS Inhibition, ROCF 3′ & 30′, and WAIS-IV Block Design & Picture Completion, all *r*s > -.20, *p*s <.05. Parkinson's patients who met criteria for any significant (> mild) level of anxiety performed worse on Coding, Trails A, DKEFS Color Naming & Word Reading, & HVLT-R Delayed Recall than those with significant (> mild) levels of depression, *t*s(>24), *p*s < .03.
Conclusions: These findings suggest different cognitive profiles for Parkinson's patients who have anxiety and those with depression. Both state anxiety and depression were negatively correlated with visual scanning, response inhibition, nonverbal memory, and visual perception and construction. However, worse simple attention, graphomotor speed, working memory, and divided attention were also exhibited by those with greater state anxiety, but not state depression. Anxiety appears to therefore have a differentially worse impact than depression on the processing speed and verbal memory of those with PD.
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B.Y. ROHL, J. LAFO, F.V. LOPEZ, P. MANGAL, B. SCOTT, E. TRIFILIO, K. FOOTE, M. OKUN & D. BOWERS. The Role of the UF Deep Brain Stimulation Cognitive Rating Scale (UF-DBS CRS) in Clinical Decision-Making: Comparing Patients who do and do not Proceed to Surgery.
Objective: Deep-brain stimulation surgery (DBS) is a widely used treatment for medication-refractory symptoms of both Parkinson's disease (PD) and Essential tremor (ET). In a previous study, we demonstrated strong construct validity for the UF-DBS Cognitive Rating Scale (CRS), a brief, actionable 5 point rating scale to communicate pre-surgical neuropsychological findings with multidisciplinary teams. In the current study, we investigated differences between subgroups of patients who did (DBS+) or did not (DBS-) proceed to DBS surgery in terms of baseline DBS-CRS scores, cognitive domain composites, and demographic factors.
Participants and Methods: We retrospectively analyzed pre -surgical data from 270 patients (190 PD, 80 ET) who were candidates for DBS surgery. All received comprehensive interdisciplinary evaluations through the UF Movement Disorders program. A total of 40 patients (DBS-) did not proceed to surgery due to cognitive (45%), psychiatric (20%), other (20%), or patient change of mind (15%). We conducted student t-tests to compare surgical and nonsurgical groups on the DBS-CRS scale, Dementia Rating Scale 2, cognitive composites (Delayed Memory, Language, Visuospatial, Working Memory, and Executive Functioning), and mood/anxiety measures (BDI-II, AS, STAI).
Results: DBS+ and DBS- groups were similar in age, education, BDI-II, AS, STAI scores (p > .05), and DRS-2 scores (p = .07). Those in the DBS+ group had significantly better (lower) UF-DBS CRS scores than those who did not [p's < .01]. In both PD and ET, the DBS+ group had significantly higher domain composite scores in Delayed Memory, Executive Function, and Language, (all p's < .01), but did not differ from the DBS- group in Working Memory or Visuospatial skills.
Conclusions: Current findings confirm the important role of neuropsychology and the UF DBS-CRS in decision making regarding DBS surgery. Results confirm the utility of a brief tool (UF DBS-CRS) for communicating complex neuropsychological findings.
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M. SARNO, W. GAZTANAGA, N. BANERJEE, A. BURÉ-REYES, M. SLUGH, M. MIRANDA & B. LEVIN. Is Preoperative Mood State Associated With Deep Brain Stimulation Outcomes in Parkinson's Disease?
Objective: Anxiety and depression are common non-motor symptoms in PD, occurring in an estimated 30%-40% of PD patients. The extent to which these emotional symptoms interfere with DBS outcomes is not well established. The aim of this study is to examine the association between pre-operative DBS emotional well-being and postsurgical cognitive, emotional, and motor performance in PD.
Participants and Methods: Forty-nine patients diagnosed with idiopathic PD and treated with DBS, underwent pre- and post-surgical evaluations involving neurological, neuropsychological, and emotional assessments (BDI-II and BAI). A subset of 15 patients were also administered the UPDRS. Patients were divided into three groups: the Anxious group (Anx), Comorbid Anxious and Depressed group (Anx+Dep), and Emotionally Asymptomatic group (EA). Groups were compared on pre to post changes in neurocognitive, mood, and motor scores using analyses of covariance (ANCOVA), controlling for education. Additional regression analyses examined whether increasing mood symptomology predicted cognitive and motor DBS outcomes.
Results: Prior to DBS, there were no significant differences between the three groups on any cognitive measure. Post DBS, there were no significant differences in any neurocognitive measure, mood inventory, or UPDRS changes among the three groups. Increased presurgical mood symptoms did not predict poorer cognitive or motor performance after DBS.
Conclusions: This study is the first to evaluate whether PD patients who are clinically anxious or have comorbid anxiety/depression prior to DBS surgery show more cognitive, emotional, and motor changes following DBS compared to those without premorbid mood symptoms. These findings indicate that anxiety and depression prior to DBS may not be a risk factor for more impaired outcomes postoperatively. Our findings emphasize the importance of discussing potential outcomes with DBS candidates before surgery, while keeping in mind that psychiatric comorbidity should not necessarily exclude patients from DBS.
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J. SEELEY MCGEE & A. TRÖSTER. Neuropsychological Effects of Depression and Anxiety Symptoms in Parkinson's Disease Patients With and Without Mild Cognitive Impairment.

Objective: To evaluate the neurocognitive effects of anxiety and depression symptom severity in Parkinson's disease without (PD) and with mild cognitive impairment (PD-MCI).

Participants and Methods: 277 patients with idiopathic PD per UK Brain bank criteria (mean age 65.28 years; mean education 14.62 years) underwent neuropsychological evaluation including, among others, the Beck Depression Inventory (BDI-II ≥ 16) and Beck Anxiety Inventory (BAI ≥ 16). Composites for executive functions, memory, and attention/speed were calculated. PD-MCI diagnosis was based on MDS Task Force Level II diagnostic criteria. ANOVAS were used to identify if neurocognitive test performances differed as a function of anxious or depressed mood in patients with PD or PD-MCI. MANOVAs were used to examine interaction effects between mood and cognitive impairment in PD vs. PD-MCI.

Results: 53% (n=147) of patients had PD-MCI. Interactions between MCI x depression (p=.20) and MCI x anxiety severity (p=.18) and main effects of depression on cognition were not significant. Main effects of MCI (p<.001) and anxiety on cognition (p<.05) were significant. PD-MCI patients with anxious mood had significantly lower attention/processing speed scores (p<.05) than those without anxious mood. Amongst PD patients, those with anxious mood had significantly lower executive functioning (p<.05) and memory scores (p<.05) than those without anxious mood. Compared to PD patients without depressed mood, PD patients with depressed mood had significantly lower attention/processing speed scores (p<.05).

Conclusions: Anxious and depressed mood may have differing effects in PD and PD-MCI patients in terms of neurocognitive performance. Further research is needed to determine the diagnostic, prognostic, and therapeutic significance of neuropsychiatric symptoms in PD patients with and without MCI. A limitation is that the data do not address whether the mood disturbance produced the MCI or whether anxious or depressed mood has limited impact on cognition once PD-MCI is established.

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M. SPLIT, F.V. LOPEZ, R. MOORE, E. PIROGOVSKY-TURK, J. FILOTEO, I. LITVAN, S. LESSIG & D. SCHIEHSER. Poor Sleep Quality and Excessive Daytime Sleepiness Predict Cognitive Decline in Parkinson's disease.

Objective: Poor sleep quality (SQ) and excessive daytime sleepiness (EDS) are common symptoms in Parkinson's disease (PD). Cross-sectionally, associations between EDS/SQ and cognitive impairment have been found, but it is unclear if sleep-related symptoms are associated with future cognitive decline in PD. Therefore, we evaluated if baseline EDS and SQ are predictive of cognitive change over a two-year timespan in individuals with PD.

Participants and Methods: Sixty-five non-demented PD patients completed a comprehensive neuropsychological battery including self-report measures of EDS (Epworth Sleepiness Scale) and SQ (Pittsburgh Sleep Quality Index) at baseline and follow-up (Mean = 2.28 years). Change scores (follow-up minus baseline) were generated for five cognitive domains: Attention, Executive Function, Memory, Visuospatial, and Language. Hierarchical regression analyses were conducted controlling for significant baseline demographics and clinical symptoms to determine whether baseline sleep symptoms predict cognitive change.

Results: Controlling for disease duration and mood, poorer baseline SQ significantly predicted visuospatial decline (p = .04) and greater baseline EDS significantly predicted a decline in attention (p = .05) over the two-year follow-up period. Baseline disease stage, motor function, levodopa equivalent dosage, age, education, and gender were not significantly related to visuospatial or attention decline, nor baseline SQ or EDS. Moreover, there were no significant associations between SQ or EDS and changes in executive function, memory, or language.

Conclusions: This study demonstrated that sleep-related difficulties in PD may be harbingers for future cognitive decline. Specifically, poor SQ and EDS are uniquely associated with declines in visuospatial function and attention, respectively. In conclusion, these findings highlight the importance of sleep evaluation in clinical practice and the potential utility of sleep interventions as a prophylactic for future cognitive decline in PD.

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B. TRAN, S. FRIEDMAN, K. TERRELL & K. LAWLER. Neuropsychological Evaluation of a Vietnamese-speaking Man with Parkinson's disease and Consideration for Deep Brain Stimulation (DBS) Surgery.

Objective: Neuropsychological evaluation is used to assess cognition in individuals considering DBS surgery and identify contraindications from cognitive or psychological perspectives. In Vietnamese-speaking individuals, the neuropsychological assessment is impacted by various factors, as there is a lack of Vietnamese tests, normative data, and culturally/linguistically-matched neuropsychologists. This case report illustrates the neuropsychological assessment of a Vietnamese-speaking man with PD as part of a comprehensive DBS evaluation.

Participants and Methods: Patient QD is a 76-year-old, Vietnamese-American man who was diagnosed with PD in 2010. Reported symptoms include tremor, rigidity, bradykinesia, and motor fluctuations. QD and his wife denied any significant problems with routine activities such as paying bills, or managing his schedule and appointments.

We selected a battery of tests that covered all cognitive domains and adapted it for Vietnamese speakers, while taking into account QD's endurance. Although the measures were translated into Vietnamese and QD was assessed by a neuropsychology postdoctoral fellow fluent in Vietnamese, there still remain language and cultural obstacles inherent within the tests.

Results: Overall performance on the neuropsychological evaluation revealed fluid intelligence in the average range, as measured by perceptual reasoning. Performance was intact across nearly all areas of cognition, including auditory attention and working memory, language, visual-perceptual and visuoconstructional skills, and executive functioning. QD demonstrated stronger overall performance for visual relative to verbal memory. Emotionally, QD denied symptoms of depression or anxiety.

Conclusions: Qualitative observations, as well as language and cultural considerations provide context for QD's performance on neuropsychological testing. Given his overall pattern of performance, there were no contraindications for DBS surgery. A follow-up visit one month post-DBS surgery revealed that QD was recovering well.

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E. TRIFILIO, B. SCOTT, P. MANGAL, J. HELPHREY & D. BOWERS. Re-EXAMIN-ing Executive Function in Parkinson Disease: Comparison of the NIH EXAMINER to Traditional Neuropsychological Measures.

Objective: The NIH EXAMINER was developed to create psychometrically robust domain-specific indices of executive function (Kramer, 2012). In line with this goal, it was designed for use across various neurological disorders, including Parkinson disease (PD). The current study builds on a previous report that a small sample of PDs differed from Controls across components of the EXAMINER. In the current study, we examined the relationship between EXAMINER composite-factor scores and traditional neuropsychological measures in order to better characterize its utility in a clinical sample of PD patients.

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Participants and Methods: Sixty patients with idiopathic PD (X age = 65.53; X disease duration = 9.72 yrs; X UPDRS-III ON = 23.93; X DRS-2 = 136.49) completed the EXAMINER and traditional executive function tasks (e.g., Trails B, Digits Backward, Stroop CW, Letter Fluency). Spearman's rho correlations were calculated for each EXAMINER composite (e.g., Executive, Cognitive Control, Working Memory, Fluency) and compared to each traditional measure. In a separate analysis, 15 PD patients were compared to age and education matched 15 healthy controls (HC). EXAMINER composites and traditional measures were transformed to z-scores using HC means and SDs.
Results: The Executive Composite significantly correlated with all traditional measures ($p < .01$). The Fluency Factor was most strongly correlated with Letter Fluency (r=.668); Cognitive Control and Working Memory factors were most strongly correlated with Stroop CW (r=.666 & -.657) and Trails B (r=.656 & -.635). Subsample comparisons to HCs showed worse performance across all composites with effect sizes (cohen's d) between .31 and .51 and traditional measures between .43 and 1.03.
Conclusions: Results suggest construct/convergent validity of the NIH EXAMINER and its composite domains in a clinical sample of PD patients. Further comparisons to healthy controls in larger samples will improve understanding of the sensitivity of this measure to executive deficits in PD.
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S. TRUTER & A.B. SHUTTLEWORTH-EDWARDS. Adaptation of the Coin Rotation Test of Hand Motor Functioning for Educationally Disadvantaged South African Adults.
Objective: The Coin Rotation Test of hand motor speed and dexterity correlates significantly with the Grooved Pegboard, Finger Tapping and Grip Strength tests (Hill et al., 2010; Mendoza et al., 2009). In these studies performance was minimally affected by age, level of education or sex. However, its usefulness with poorly educated populations remains unverified. The study aimed to investigate performance on an adapted version of this test for healthy, non-English speaking South African adults with disadvantaged quality of education.
Participants and Methods: As part of a larger neuropsychological battery, the Coin Rotation Test was administered to healthy South African adults who spoke one of the 11 official SA languages other than English (N = 163), aged 18-57 years, with 8-12 years of disadvantaged quality of education, including right-handed ($n = 150$) and left-handed individuals ($n = 13$). The test was adapted by using a 50c South African coin instead of the similar-sized US nickel or quarter (Mendoza et al., 2009; Hill et al., 2010). The effects of age, level of education, sex and handedness were explored.
Results: There were no significant differences between the 18-29, 40-49 and 50-57 year old age groups, for 8-10 versus 11-12 years of education, or for males versus females. For both right- and left-handed participants the dominant hand was significantly quicker than the non-dominant hand. Dominant hand functioning did not differ significantly between right- and left-handed participants, but non-dominant hand functioning was significantly quicker for right-handed compared with left-handed participants.
Conclusions: The adapted Coin Rotation Test distinguishes well between dominant and non-dominant hand motor functioning in South African right- and left-handed, non-English first-language adults with disadvantaged quality of education. As found in previous studies age, level of education and sex played no significant role in the test scores.
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E.R. WALLACE, J.P. HARP, S.L. BROTHERS, J.E. QUINTERO, C.G. VAN HORNE, F.A. SCHMITT & L.M. KOEHL. Neurocognition in Post-Bilateral Globus Pallidus Interna Deep Brain Stimulation with Adjunctive Substantia Nigra Sural Nerve Graft in Parkinson's Disease.
Objective: Globus pallidus interna (GPi) deep brain stimulation (DBS) shows benefit in improving movement and quality of life in Parkinson's disease (PD). GPi DBS is thought to result in better cognitive outcomes than subthalamic nucleus (STN) DBS with preservation of verbal fluency, attention, and executive functioning. A recent pilot study examined whether dopaminergic neurons affected by PD can be regenerated via peripheral nerve graft implantation during GPi DBS. Current results assess the safety of this novel procedure and examine postoperative cognitive decline.
Participants and Methods: Data were compared from baseline and 2-year postoperative neurocognitive evaluations for 14 patients with PD undergoing bilateral GPi DBS with unilateral sural nerve graft to the substantia nigra (SN). Paired sample t-tests were conducted and Cohen's d effect sizes calculated to evaluate pre- and post-surgical differences.
Results: Of the neurocognitive domains examined, performances in phonemic fluency ($t(13) = 2.95$, $p < .05$), working memory (Digit Span, $t(13) = 3.46$, $p < .01$), and processing speed (Stroop Color, $t(13) = 2.24$, $p < .05$) significantly declined between evaluations. Effect sizes indicate a small decline for verbal speed ($d = .41$) and medium declines for phonemic fluency ($d = .50$) and working memory ($d = .76$).
Conclusions: The magnitude of observed declines was generally consistent with STN DBS in extant literature but somewhat larger than those for GPi DBS. The overall preservation of executive functioning indicates consistency with the literature. Results provide further information on possible frontostriatal disruption following DBS and provide initial evidence of SN graft safety as the procedure does not appear to impact cognition above and beyond standard approved DBS procedures. Limitations include small sample size and lack of control for dopaminergic medication dose. Once safety is well-established, future research is needed to further determine cognitive outcomes in GPi DBS with sural nerve graft.
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N. WHITELEY, A.E. CABRERA TUAZON, C.F. PLUIM, E. MCCALLUM, S. LESSIG, I. LITVAN, J. FILOTEO & D. SCHIEHSER. A History of Traumatic Brain Injury Exacerbates Poor Quality of Life in Parkinson's Disease.
Objective: Individuals with Parkinson's (PD) have poorer Quality of Life (QoL) compared with healthy controls. Similar findings are found in subjects with history of mild-moderate traumatic brain injury (mmTBI). However, QoL in individuals with *both* PD and mmTBI remains relatively unknown; such information could be clinically informative. The current study examined the impact of mmTBI on QoL in individuals with PD.
Participants and Methods: Individuals with PD and a history of mmTBI (PD+TBI; n=25) and 30 demographically-matched PD participants without a history of TBI (PD-TBI) completed a QoL questionnaire (Parkinson's Disease Questionnaire; PDQ-39), which includes eight subscales (Mobility, Activities of Daily Living, Stigma, Social Support, Emotional Well Being, Cognition, Communication, Bodily Discomfort). One-way (PD+TBI vs. PD-TBI) analyses of variance with the PDQ-39 total score and subscale scores serving as depended variables were conducted.
Results: The PD+TBI group demonstrated significantly poorer overall QoL compared to the PD-TBI group ($p = .02$). Groups significantly differed on the PDQ-39 subscales of Activities of Daily Living ($p = .001$), Social Support ($p = .01$), and Communication ($p = .03$), and there was a trend towards significance on the Emotional Well-Being subscale ($p = .088$).

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Conclusions: Results suggest a past history of mmTBI exacerbates poor QoL in PD, specifically in the areas of social support, communication, function (activities of daily living) as well as emotional well being. These findings have important clinical implications; specifically, findings underscore the critical need for TBI history assessment in the clinical care of PD patients. Moreover, findings provide guidance for implementing targeted treatments focused on function, social support, emotional well being, and communication with the ultimate goal of improving QoL in PD patients with a history of mmTBI.

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L. WOLFF, S. ORTIZ-HERNANDEZ, S. BEEVERS, D. DRANE & J. BENGE. A Pilot Study of the Relationship Between Action Generation and Apathy in Parkinson's Disease.

Objective: Individuals with Parkinson's disease (PD) frequently experience apathy, defined by difficulty initiating goal directed actions. Intriguingly, individuals with PD also frequently experience difficulties with generating action words and other aspects of verb processing. The purpose of this pilot study was to explore the relationship between action language production and apathy in persons with PD.

Participants and Methods: 10 non-demented patients with PD were recruited to participate in an on-going study of language difficulties in PD. Participants completed cued verbal fluency tasks for semantic (animals, supermarket items, and famous people) and action words. Individuals also completed the Dimensional Apathy Scale (DAS) which taps three domains of apathy: executive, emotional, and behavioral/cognitive initiation (BCI).

Results: In this small sample, rapid generation of actions was not associated with self-reported apathy, but the benefit from cued action fluency was strongly associated with the BCI aspects of apathy (rs=.752, p<.012). In contrast, semantic cued fluency was not associated with BCI dimension of apathy. Emotional and executive aspects of apathy were not strongly associated with verbal fluency measures, though trends were noted for some of the subscales in this small sample.

Conclusions: In this preliminary analysis of language difficulties in PD, the ability to benefit from cues in action fluency as positively associated with self-reported behavioral manifestations of apathy (particularly problems with initiation of action). This provides some preliminary evidence of a linkage between action language and action production in PD. As this association appeared selective for action initiation and action words (not semantic), this may reflect the concept of "embodied cognition."

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Multiple Sclerosis/ALS/Demyelinating Disorders

M. AZAR, C. HICKEY, R. WILLIAMS, G. NAVARRO, T. LEIST, C. SCOTT & M.T. SCHULTHEIS. Processing Speed in MS: A Unique Predictor of Multitasking performance across all vocational status groups.

Objective: Research has shown that an isolated set of cognitive abilities likely support multitasking. A prior study has shown that performance on a validated measure of multitasking ability (i.e., Vocational Multitasking Test, VMT) is related to processing speed in MS. Given previous findings and the novelty of VMT, the current study examined contributions of processing speed, verbal memory, and executive functioning to performance on the VMT.

Participants and Methods: Individuals with clinically defined MS(n=40) completed the VMT, a vocational interview, and neuropsychological measures as part of a larger study. Participants were grouped by vocational status since diagnosis, i.e., employed without change in work hours(E,n=19), reduction in work hours(RE,n=27), and unemployed(UE, n=21). Total score and three qualitative variables were calculated for the VMT. Spearman correlations were calculated between neuropsychological measures and VMT within each group. Multiple regression analyses explored the predictive value of cognitive measures on the VMT for each group.

Results: *Results:* VMT Total score was related to SDMT in the E(r=0.79, p<0.001), UE(r= 0.53, p<0.05), and RE groups (r=0.55, p<0.01). VMT Error score was related to PASAT(r=-0.43, p<0.05) and SDMT performance (r=-0.41, p<0.05) in the RE group. Multiple regression analyses indicated that SDMT(p<0.05)uniquely predicted VMT performance above and beyond PASAT and Trails A performance in the UE, $F(3, 11) = 3.79$, $p < .05$, $R^2 = .51$, *Adj* $R^2 = .37$, E, $F(3,11)=3.23$, $p=0.05$, $R^2=0.41$, *Adj* $R^2=0.28$, and RE groups, $F(3,18)=3.83$, $p<0.05$, $R^2=0.39$, *Adj* $R^2=0.29$.

Conclusions: Current findings extend prior research by demonstrating that a certain aspect of processing speed is predictive of multitasking-related productivity in MS regardless of vocational status. Future research should further investigate the utility of processing speed compensatory mechanisms in cognitive interventions to target multitasking in the vocational setting

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M. BERTOLIN, H. WILKS, C. TEAGUE & D. KAUFMAN. The Association Between Neuropsychological Functioning, Coping Strategy Use, and Quality of Life in Individuals with Amyotrophic Lateral Sclerosis.

Objective: Prior research shows that successful coping has been associated with preserved quality of life (QOL) in individuals with amyotrophic lateral sclerosis (ALS), whereas cognitive/behavioral impairment, emotional difficulties, and poor QOL have been shown to increase risk for poor prognosis. Consequently, the current study examined the association between neuropsychological functioning, coping strategy use, and QOL in individuals with ALS.

Participants and Methods: Twenty-three participants with ALS and their family members completed standardized questionnaires assessing participants' cognitive, behavioral, and emotional functioning, self-reported QOL, use of coping strategies, and degree of functional disability associated with disease progression.

Results: Results revealed that approximately one-half of participants exhibited some degree of cognitive/behavioral impairment and one-third met behavioral criteria for possible dementia. Apathy emerged as the most prominent cognitive/behavioral deficit associated with ALS and although emotional difficulties were also frequently endorsed, cognitive/behavioral impairment and emotional difficulties were dissociable and had differential impacts on self-reported QOL. Specifically, depressive symptoms endorsed by participants, and not severity of cognitive/behavioral impairment, significantly predicted worse overall QOL. In addition, although participants endorsed greater use of problem-focused relative to emotion-focused coping strategies, more frequent use of emotion-focused coping strategies significantly predicted better overall QOL.

Conclusions: Taken together, these findings indicate that screening for cognitive/behavioral impairment and emotional difficulties is an essential component of clinical care for this population and promoting use of emotion-focused coping strategies may help preserve QOL and increase opportunities for more positive outcomes for individuals living with ALS.

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B. BORON, S. FOUNTAIN-ZARAGOZA, B. SCHIRDA & R.S. PRAKASH. Neural Correlates of Emotion Regulation in Multiple Sclerosis.

Objective: Cognitive reappraisal, involving reinterpreting negatively valenced stimuli, is generally considered an adaptive emotion regulation strategy. In healthy adults, reappraisal has been found to decrease negative emotional experiences, accompanied by increased recruitment of executive control regions and reduced activation in emotion-generating regions. However, there are few studies examining the neural correlates of reappraisal in populations with chronic medical illnesses, such as individual with Multiple Sclerosis (MS) who experience greater emotion dysregulation and higher rates of cognitive impairment than the general population.

Participants and Methods: This study investigated the associations between cognitive function, measured using the WAIS-IV working memory index, and neural and behavioral correlates of reappraisal in 36 participants (ages 30-59) diagnosed with relapsing-remitting MS. Participants completed an emotion regulation task in the MRI, where they were asked to use reappraisal or simply observe negative or neutral health-related images.

Results: When viewing negative compared to neutral images, participants reported higher negativity ratings and were less successful at suppressing regions of the default mode network, likely representing internal mentation in response to the images. Implementation of reappraisal resulted in significant downregulation of negative emotions and activation of regions frequently observed in previous studies of healthy adults, including inferior and superior frontal gyrus and dorsolateral prefrontal cortex (dlPFC). However, during reappraisal, those with lower cognitive resources exhibited less recruitment of the dlPFC as well as poorer reappraisal success. Decreased recruitment of these executive control regions, implicated in successful reappraisal, was also directly related to less regulation success.

Conclusions: These results suggest that greater cognitive deficits in individuals with MS are linked to reduced success in implementing emotion regulation strategies.

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M.L. BRADSON, C.A. F. ROMAN & P. ARNETT. Cerebral Activation during Working Memory in Multiple Sclerosis Patients with and without the APOE Epsilon-4 Allele.

Objective: Increased cerebral activation patterns have been demonstrated during working memory tasks using functional magnetic resonance imaging (fMRI) in individuals diagnosed with multiple sclerosis (MS) and in cognitively intact persons genetically at risk for Alzheimer's disease. Few studies have compared brain activation patterns associated with working memory as a function of the apolipoprotein E (APOE) genotype in individuals with MS, despite evidence suggesting APOE's role in myelin formation, myelin repair, and neuronal plasticity processes. The purpose of this study was to determine whether the ε4 allele of the APOE gene influences brain activation in a sample of cognitively similar patients with MS.

Participants and Methods: The sample (N = 41) was composed of 13 APOE-ε4+ and 28 APOE-ε4- patients with MS. All participants completed a full neuropsychological assessment battery prior to undergoing fMRI to perform the N-back task used to probe working memory-related brain activity. Using Statistical Parametric Mapping 8 (SPM8), a two-sample t-test was used to compare brain activation in APOE genotype groups.

Results: Independent samples t-tests verified APOE group equivalences in demographic characteristics and on neuropsychological performance variables. Compared to the APOE-ε4- group, the APOE-ε4+ group exhibited greater activity in the medial frontal regions bilaterally and in the right dorsolateral prefrontal cortex.

Conclusions: Given that APOE groups were equivalent demographically and cognitively, group differences in brain activation can be attributed to APOE genotype differences. The greater activation observed in APOE-ε4 carriers may suggest a compensatory mechanism to offset inefficient cognitive processes that occur when the brain is impacted by MS and the APOE-ε4 allele.

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A. BUCHANAN, S. LALL, J. SANDRY & J. SUMOWSKI. Sensitive but not Specific: The Multiple Cognitive Processes Captured by the SDMT in Multiple Sclerosis.

Objective: The Symbol Digit Modalities Test (SDMT) is widely used as a screening tool to assess cognitive functioning in multiple sclerosis (MS). The SDMTs' sensitivity to cognitive impairment has been reliably demonstrated, however, it remains unclear what specific cognitive processes underlie performance on the test. In the MS literature, researchers often interpret the SDMT as a sensitive measure of information processing speed. The main aim of the present investigation is to evaluate what cognitive processes, beyond information processing speed, contribute to performance on the SDMT.

Participants and Methods: 185 MS patients (N=165 relapsing remitting; N=20 clinically isolated syndrome) who were within 5 years of diagnosis were assessed as part of a larger testing session. A comprehensive neuropsychological assessment battery was used to evaluate performance across multiple cognitive domains.

Results: Latent cognitive constructs for processing speed/attention, memory, and language were reduced using principal component analysis and entered as independent variables in a linear regression predicting performance on the SDMT. All three cognitive domains significantly predicted performance on the SDMT, (R^2 = .58, p < .001). Specifically, the SDMT was related to processing speed/attention (β = .37; p < .001) as well as memory (β = .23; p < .001) and language (β = .29; p <.001). Tests for multicollinearity yielded low scores indicating that multicollinearity was not an issue (*VIF* = 1.42 for memory, 2.12 for speed/attention and 2.11 for language).

Conclusions: The usefulness of the SDMT at identifying cognitive impairment in MS may be because it requires multiple cognitive processes beyond information processing speed. Clinicians and researchers should consider using the SDMT as a general measure of cognitive performance in MS. Low performance on the SDMT should be followed with a more comprehensive neuropsychological evaluation, with special attention given to other cognitive domains including memory and language.

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M. CADDEN & P. ARNETT. APOE ε4 as a Risk Factor for Depression in Multiple Sclerosis.

Objective: Despite lack of evidence connecting the APOE ε4 allele to course type or overall clinical disability in Multiple Sclerosis (MS), some studies have found ε4 carriers to have worse brain integrity and poorer cognitive functioning even among those young in age and low in clinical disability (Burwick et al., 2006; De Stefano et al., 2004; Shi et al, 2008; Weatherby et al., 2000). The objective of the current study was to examine if the APOE ε4 allele posed a similar risk for another common sequelae of MS - depression.

Participants and Methods: Fifty-four people with MS (PwMS) were examined. Depression was measured using the Beck Depression Inventory-Second Edition (BDI-II). In addition to collecting demographic (e.g., age) and disease (e.g., EDSS, diagnosis duration) related variables, participants underwent genetic testing (using buccal swabs) for APOE allele status. Individuals were assigned as either APOE ε4+ or ε4-. Three regression analyses predicting depression (BDI-II) from APOE status

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(ε4+ or ε4-), and either 1) age, 2) EDSS, or 3) diagnosis duration, and their respective interactions were conducted.
Results: The interaction between the APOE status and both age ($F(1,50) = 9.1$, $p = .004$) and EDSS ($F(1,50) = 4.6$, $p = .037$) were significant. These interactions demonstrated that the relationship between APOE status and depression depended on age and clinical disability level. Specifically, being an ε4 allele carrier increased risk of depression at younger ages and lower clinical disability.
Conclusions: Genetics, specifically the APOE gene, may play a role in developing depression in MS, especially among those who are young and low in clinical disability. Being aware of APOE allele status could thus help inform PwMS and their health care providers about relative risk for depression and encourage mental health intervention at an early stage of the disease.
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T. COSTABILE, A. CAROTENUTO & F. SACCÀ. Can Olfaction be a Marker of Progression in Multiple Sclerosis?
Objective: The aims of our study were:
1) Assess smell identification in a cohort of Relapsing Remitting Multiple Sclerosis (RRMS) and Progressive Multiple Sclerosis (PMS) patients
2) Investigate relations between smell ability and cognitive and clinical features of the disease.
Participants and Methods: 55 patients (age 45.9 ± 14.25 years) were enrolled. Of these 30 patients were RRMS and 25 were PMS.
We used 9 Hole Pegboard Test (9HPT), Timed 25-Foot Walk Test (25FWT) and EDSS as clinical measures; University of Pennsylvania Smell Identification Test (UPSIT-40) to assess smell identification; Orientation Test, Symbol Digit Modalities Test (SDMT), California Verbal Learning Test (CVLT2), Brief Visuospatial Memory Test (BVMTR), Controlled Oral Word Association Test (COWAT) and PASAT for cognitive abilities. Plus, we included BDI II and Modified Fatigue Impact Scale as further scales.
Results: The overall prevalence of olfactory impairment in our sample ranged from 55% to 85%.
MS with cognitive impairment had lower UPSIT 40 scores than MS without cognitive impairment (32 ± 4.2 vs 26.3 ± 5.1, $p<0.001$).
Partial correlations controlled for age, gender and education classes revealed negative correlations between UPSIT 40 and 9HPT for dominant hand and Cerebral Functional Score of the EDSS.
Again, positive correlations were found between UPSIT 40 and SDMT, BVMTR in both immediate and delayed recalls and COWAT.
As a second step we performed a multivariate regression and found that 9HPT for dominant hand and SDMT were independent predictors ($R^2=0.454$; intercept 25,468; $p<0.001$). Thus, higher motor or cognitive disability predicts identification performances regardless of the EDSS and the MS type.
Conclusions: In conclusion, can we use smell as a marker to predict the switch from a RRMS type to PMS one?
Actually, we have to disconfirm this hypothesis as olfactory dysfunction may represent a feature of a widespread brain dysfunction in MS patients more than a proper marker of progression.
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L. CRIVELLI, I.L. CALANDRI, M. HELOU, L. NEGROTTO, M.P. FIOL, M.C. YSRRAELIT, R. ALLEGRI & J. CORREALE. Work Related and Quality of Life Consequences of Early Multiple Sclerosis.
Objective: To study the work status, the perceived workplace difficulties and cognitive performance of patients with early MS and their impact on quality of life.
Participants and Methods: Patients were recruited from the outpatient MS clinic at the Raul Carrea Institute for Neurological Research (FLENI) by attending neurologists. Thirty-four relapsing-remitting MS patients, fulfilling 2017 McDonald criteria, with ≤ 2 years disease duration and scores ≤2 on EDSS, were included. Thirty subjects matched for age, gender, and educational level, recruited from a local volunteer group, served as controls. Both groups underwent complete neuropsychological evaluation (Rao BRB). Work Status was inquired (employed/unemployed), work place difficulties were assessed using the Multiple Sclerosis Work Difficulties Questionnaire (MSWD-23) and Quality of Life was assessed by the MusiQuol.
Results: Groups did not differ significantly in age, sex, educational level or in the neuropsychiatric scales that assessed depression, anxiety and apathy. Patients showed significant deficits in cognitive tests of verbal memory, executive functions and language (Rao BRB). Groups did not differ in their employment status (p=0.58). However, patients had greater work difficulties than controls reflected by the MSWDQ-23 total score ($p = 0.002$), the Psychological Barriers subscale (p=0.032), the Physical Barriers subscale (p=0.001), and the External Barriers subscale (p=0.009). Furthermore strong correlations were observed between the MSWDQ-23 and the evaluation of the quality of life (Musiquol) (r=0.75, p=0.000).
Conclusions: Patients with early MS present work related difficulties even when working status is still stable. These difficulties impact on patients quality of life and are probably the source of unemployment problems present in later stages of the disease. Early detection of work related difficulties may contribute to the design of employment protection policies for these patients.
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L. CRIVELLI, I.L. CALANDRI, M. HELOU, L. NEGROTTO, M.P. FIOL, M.C. YSRRAELIT, R. ALLEGRI & J. CORREALE. Social Cognition Deficits in Early Multiple Sclerosis.
Objective: To study different components of social cognition including theory of mind, empathy and emotion recognition in patients with early MS.
Participants and Methods: Patients were recruited from the outpatient MS clinic at the Raul Carrea Institute for Neurological Research (FLENI) by attending neurologists. Thirty-four relapsing-remitting MS patients, fullfilling 2017 McDonald criteria, with ≤ 2 years disease duration and scores ≤2 on EDSS, were included. Thirty subjects matched for age, gender, and educational level, recruited from a local volunteer group, served as controls. Both groups underwent complete neuropsychological evaluation (Rao BRB). Social Cognition was assessed using the International Affective Picture System (emotional processing), The Mind in the Eyes Test the Empathy Quotient, and the Faux Pas Test. Neuropsychiatric scales were also administered (HADS, Apathy Evaluation Scale).
Results: Groups did not differ significantly in age, sex, educational level or in the neuropsychiatric scales that assessed depression, anxiety and apathy. Patients showed significant deficits in cognitive tests of verbal memory, executive functions and language (Rao BRB). Social cognition assessment showed that patients presented greater difficulties in Reading the Mind in the eyes tests; $p = 0.014$), in the detection of socially inappropriate behaviors (Faux Pas Test p= 0.009) and a positive bias was observed in the interpretation of neutral images in the emotional reactivity test (IAPS $p = 0.023$). No differences were observed in the Empathy Quotient performance.
Conclusions: Patients with early MS present disorders in cognitive functions and social cognition. Social cognition deficits are an important component of cognitive functioning and must be taken into account in early MS patients. They have strong impact on social functioning and quality of life. Future research is needed to study the longitudinal course of these disorders.
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M.G. DI BENEDETTO, A. BECKER & L. STROBER. From the Negative to the Positive: Re-evaluating How we Understand Well-Being in Multiple Sclerosis (MS).

Objective: A great amount of attention has been paid to depression and anxiety in multiple sclerosis (MS). These aspects of well-being can be characterized as subjective well-being (SWB), which is typically construed as happiness (balance of positive and negative affect) and life satisfaction (SWL). Psychological well-being (PWB) or eudaimonic happiness has received far less attention in MS. Psychological well-being defines a more comprehensive sense of well-being that includes actualizing one's potential, living well, having a sense of purpose, and securing good relations with others. These concepts provide a much fuller picture of an individual and their overall well-being. Previously, in healthy populations, PWB has been shown to vary with age. In the present study, we sought to investigate if the same trends of PWB varying with age can be seen in the MS population, while also examining the relationship that depression, anxiety and life satisfaction may have with PWB.

Participants and Methods: 184 participants with MS completed the Ryff's Psychological Well-Being Scales, the Satisfaction with Life Scale, the State-Trait Anxiety Inventory, and the Chicago Multiscale Depression Inventory. The sample was stratified into four age groups (<35; 35-44; 45-54; 55-64).

Results: We found that while depression and SWL did not differ by age, PWB did. More specifically, older individuals reported greater PWB with regard to personal relationships, purpose in life, environmental mastery, and self-acceptance. More striking, is that these changes appear to occur in tandem with a steady decline in anxiety.

Conclusions: Findings suggest that greater attention be given to these "positive" changes and the role of anxiety in MS and less to the negative (e.g., depression) as it may not be providing the best picture of those living and aging with MS.

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H.G. DIAS, L. GLUKHOVSKY & J. SUMOWSKI. Examining the Relationship of Depression and Multitasking in Early Multiple Sclerosis Using a Novel Measure.

Objective: To evaluate a novel measure of multitasking in identifying cognitive difficulties in individuals with Multiple Sclerosis (MS) and depression.

Participants and Methods: 183 participants recently diagnosed with MS completed the NYC Reserve Cohort study, which included measures of cognition and depression (Symbol Digit Modalities Test [SDMT]; Stroop, Digit Span, Selective Reminding Test [SRT], Brief Visuospatial Memory Test-Revised [BVMT-R], Controlled Oral Word Association Test, Beck Depression Inventory-Fast Screen [BDI-FS], Mental Health Inventory [MHI]). To examine multitasking, participants completed an original test of information processing speed at the same time as an auditory attention test. A composite measure of depression was calculated using the BDI-FS and MHI.

Results: Depression was most significantly correlated with multitasking (r_p = -.364, p<.001), followed by Stroop (r_p = -.296, p<.001), controlling for age and sex. SDMT (r_p = -.262, p<.001), Digit Span (r_p = -.229, p=.002), and BVMT (r_p = -.158, p=.034) were also correlated with depression. Stepwise linear regression revealed that multitasking was the sole independent predictor of depression, controlling for age and sex.

Conclusions: The novel measure of multitasking best predicted depression as compared to other cognitive measures. These findings provide evidence for a significant relationship between depression and multitasking. Because multitasking has ecological validity, this test could be used in conjunction with conventional neuropsychological tests to assess real-world difficulties that individuals with MS may experience.

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L. GLUKHOVSKY, A. BUCHANAN & J. SUMOWSKI. Dissociating Nonverbal and Verbal Memory Using Objective and Subjective Measures in Early Multiple Sclerosis.

Objective: To understand nonverbal and verbal memory as dissociable processes by examining memory in persons with early MS on three levels: neuropsychological, self-report, and neuroimaging measures.

Participants and Methods: Persons with early MS (n=185) from the NYC Reserve Cohort completed measures of verbal memory (Selective Reminding Test, SRT), nonverbal memory (CANTAB Paired Associates Learning, PAL), and subjective cognitive complaints (Perceived Deficits Questionnaire, PDQ). MRI measured normalized volumes of total gray, thalamus, medial temporal lobe (MTL: total, hippocampus, amygdala). Partial correlations examined links among objective memory tasks, subjective memory, and gray matter volumes, controlling for age and sex. Follow-up stepwise linear regression identified independent MRI predictors of objective and subjective memory, controlling for age and sex.

Results: Principal components analysis derived three types of subjective cognitive complaints: Nonverbal Memory, Language Function/Verbal Memory, Attention/Executive Function. Nonverbal Memory was only independently related to PAL (p=.007), whereas Language Function/Verbal Memory was related to SRT (p=.001) and PAL (p=.016). Neuroimaging analyses: Nonverbal Memory was related to hippocampal (p=.005), amygdalar (total p=.01, left amygdala p=.004), and MTL (left p=.001, right p=.01) volumes. PAL was linked to hippocampal (total p=.024, left hippocampus p=.014), left amygdalar (p=.042), and left MTL (p=.006) volumes. SRT was linked only to thalamic volume (p=.004). Left MTL was the sole independent predictor of objective nonverbal memory (PAL), while thalamus was the sole predictor of objective verbal memory (SRT).

Conclusions: In this cohort of persons with early MS, nonverbal memory related to MTL structures, while verbal memory related to other underlying factors. Contrary to past findings on self-reported cognition in MS, sensitive objective measures of cognition correlated with subjective memory.

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J.G. GRANT, L.J. RAPPORT, R. DARLING, B. WALDRON-PERRINE & E. BERNITSAS. Existential Well-Being Predicts Health Outcomes in Multiple Sclerosis.

Objective: The present study examined the relationship between religious well-being (RWB), existential well-being (EWB), and health outcomes in multiple sclerosis (MS). Prior research has focused primarily on RWB and EWB in the context of subjective well-being; few studies have examined objective health outcomes, such as disease severity and disability.

Participants and Methods: Participants were 39 adults with MS (80% women, 74% Christian). Months since diagnosis ranged from 0.4 - 31. Objective health outcomes included the Timed 25-Foot Walk (T25FW) and neurologist-rated Expanded Disability Status Scale (EDSS), whereas subjective health (quality of life) was assessed with the Multiple Sclerosis Impact Scale (MSIS-29) Physical and Psychological subscales (high scores indicate disability on all outcome scales). Participants also completed the Spiritual Well-Being Scale RWB and EWB scales and a neuropsychological battery.

Results: No health outcomes were significantly correlated (p < .05) with RWB. MSIS Physical (r = -.41) and Psychological (r = -.59) distress scales correlated with EWB. Curve estimation revealed nonlinear relationships for EWB in which quadratic models for EDSS (r = .48) and T25FW (r = .46) fit significantly better than linear models. Among participants with mild-moderate disability, EWB showed inverse correlation with EDSS (r = -.40), MSIS-Physical (r = -.53), and MSIS-Psychological (r = -.59) and T25FW (r = -.25). In contrast, among participants with severe disability EWB showed strong positive correlation with EDSS (r = .68) and T25FW (r = .70).

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Conclusions: EWB predicted MS health outcomes, whereas RWB did not. Subjective health increased with EWB. For objective health, EWB may serve different functions for patients at different stages of the illness: Greater EWB is related to better outcomes among patients with low disability (possibly facilitating health) but poorer objective outcomes among patients with advanced MS (possibly facilitating coping with declining health).

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P. HAKE, S. L COSTA & Y. GOVEROVER. Olfactory and Gustatory Processing in MS and its Relation to Memory.

Objective: Visual, cognitive and motor impairments are prevalent in Multiple Sclerosis (MS), however other sensory functions such as olfactory and gustatory processing are not well understood. The current study aims to examine self-reported olfactory and gustatory processing in MS and its relation with memory, processing speed (PS) and global disability (GD).

Participants and Methods: 75 individuals with MS and 39 healthy controls (HC's) completed the Adolescent/Adult Sensory Profile Questionnaire to assess olfactory/gustatory processing. The California Verbal Learning Test (CVLT-II) was used to measure verbal memory. The Symbol Digit Modalities Test (SDMT) and the Paced Auditory Serial Addition Test (PASAT 3″) were used to measure processing speed and the Multiple Sclerosis Functional Composite (MSFC) was used to measure global disability. Individuals with MS were divided into a cognitively impaired group (n=23) and a not-impaired group (n=52) based on their performance on the Brief International Cognitive Assessment for MS.

Results: The cognitively impaired group reported significantly higher thresholds of olfactory/gustatory processing (which requires higher intensity stimuli to process taste/smells) compared to the not-impaired group and the HC group ($F(2,111)= 5.69$, $p< .01$). High olfactory/gustatory thresholds were found to be negatively correlated with memory ($r= -.24$, $p< .05$) but were not correlated with GD ($r= -.17$, $p= .17$), the SDMT ($r= -.21$, $p=.07$) or PASAT ($r= -.07$, $p= .54$).

Conclusions: This study found that individuals with MS with cognitive impairments report greater difficulty in processing olfactory and gustatory stimuli. Persons that report such difficulties also tend to perform poorly on tests of memory. Future research should further examine olfactory/gustatory processing in MS and examine the relation between olfactory/gustatory deficits and memory.

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J. HOFFMEISTER, M. BASSO, R. MULLIGAN, B. REYNOLDS, D. WHITESIDE & D. COMBS. Neurobehavioral Correlates of Euphoric and Dysphoric Mood in Multiple Sclerosis.

Objective: Cognitive dysfunction is present in between 43-70% of people with multiple sclerosis (MS). Additionally, depression is a common comorbidity, with prevalence as high as 50%. Studies on the effects of depression on cognitive performance in MS are mixed. However, few studies have investigated potential effects of positive affect on cognitive performance in MS. The current study investigated the effects of euphoric and dysphoric mood across multiple cognitive domains in people with MS.

Participants and Methods: Participants included 96 people with MS and 48 healthy people. They were primarily female (75%), and Caucasian (90.3%). Participants were administered the Chicago Multidimensional Depression Inventory (CMDI) to assess negative and positive affect. Participants were administered a battery of cognitive tests assessing domains of: retrospective, prospective, and working memory, verbal fluency and reasoning, information processing speed, and planning.

Results: Multiple regression analyses were run to determine whether positive or negative affect was most associated with cognitive performance. Demographic and MS-specific disease factors were entered as control variables. Tolerances were acceptable and ranged from .60 to .99. Positive affect accounted for significant variance in domains of retrospective memory, verbal fluency, and information processing (*sr*'s ranged from .18 to .26). Negative affect failed to account for significant variance on any of the neuropsychological indices.

Conclusions: Overall, positive affect explained more unique variance than negative affect in multiple domains of cognitive performance. These data imply that the presence of negative affect is not as much of a morbidity risk as the absence of positive affect (i.e., anhedonia). Such data conform with existing research involving major depressive disorder showing that anhedonia may be a risk factor for cognitive impairment among individuals with primary mood disorder.

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M. JAWORSKI, D. JAKIMOVSKI, B. WEINSTOCK-GUTTMAN, A. NIZINSKI, P. SRINIVASAN, S. ROY, T. FUCHS, K. SZIGETI, R. ZIVADINOV & R. BENEDICT. Cognitive Profiles of Aging in Multiple Sclerosis.

Objective: Improvements in the availability and efficacy of multiple sclerosis (MS) disease modifying therapies (DMTs) are enhancing quality of life and longevity. Therefore, there is a need for determining the presence of comorbid Alzheimer's disease (AD) in aging MS patients. The objective of this paper was to assess the cognitive performance of aging MS patients and age-matched healthy controls (HCs') using both MS and AD-specific psychometrics.

Participants and Methods: 104 aging MS patients (mean 62.1 years old) and 78 HCs' (mean 62.8 years old) underwent neuropsychological examination which included Minimal Assessment of Cognitive Function in Multiple Sclerosis battery, and AD-specific tests of generative fluency, Boston Naming Test and Wechsler Memory Scale logical memory. Z-scores were calculated based on <-1.5 standard deviations from HCs' performance. Student's *t*-test, χ^2, and Mann-Whitney were used and Benjamini-Hochberg-adjusted p-value <0.05 was considered significant.

Results: Sixty-one percent (61%) of aging MS patients presented with cognitive impairment on at least one cognitive domain. Aging MS patients had worse performance in processing speed (SDMT $d=0.706$, $p<0.001$) and generative language fluency (letter $d=0.572$, $p=0.001$; and categorical $d=0.784$, $p<0.001$). The most frequent domain-based impairments were generative language fluency (25%) and processing speed (20.2%). When compared to their younger counterparts, older HCs' demonstrated larger age-associated decline in verbal memory, processing speed, and executive function, whereas older aging MS patients did not.

Conclusions: More than half of the aging MS patients present with cognitive impairment. Beyond processing speed impairment, aging MS patients present with slower generative language performance. MS patients experience less age-associated cognitive decline when compared to HCs'.

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S. KRAMER, K. LINDBERG & L. HINES. Examination of Profile Elevations on the Personality Assessment Inventory in an Multiple Sclerosis Population.

Objective: Previous research has examined Minnesota Multiphasic Personality Inventory 2 (MMPI-2) profiles of those with Multiple Sclerosis (MS) and showed common clinical elevations on Hysteria (Hs), Depression (D), Hypochondriasis (Hy), and Schizophrenia (Sc). Similar research has not investigated MS profiles on the Personality Assessment

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Inventory (PAI). The purpose of this study was to identify PAI profiles of MS patients.
Participants and Methods: Participants were 55 MS patients clinically referred for an outpatient neuropsychological evaluation within a rural healthcare setting, ages 21-71. Archival data collection was completed by chart review of patient files.
Results: Of the 55 participants, 46% showed a clinical elevation on Somatization (SOM). 20% of participants had a diagnosis of Somatic disorder with 64% of those individuals showing clinical elevation on SOM. 26% of participants showed a clinical elevation on Depression (DEP). 48% had a diagnosis of a depression with 42% of those individuals showing clinical elevation on DEP. 13% participants showed clinically elevated scores on Anxiety Related Disorders (ARD). 35% had a diagnosis of an anxiety related disorder with 26% of those individuals showing clinical elevation on ARD. 13% of participants showed clinical elevation on Schizophrenia (SCZ), with none having a diagnosis of Schizophrenia. 11% of participants showed a clinical elevation on the Stress (STR) subscale.
Conclusions: On the PAI, a profile of clinical elevations on DEP, SOM, and SCZ was apparent for MS patients. These findings may indicate the PAI is able to adequately capture a similar MS profile to the MMPI-2. Alternatively, the PAI profile highlighted difficulties in anxiety and stress, which suggests the PAI may be sensitive in identifying anxiety and life stressors within an MS population. Future research should directly compare MMPI-2 and PAI profiles in the same individuals to confirm these findings and if Hs and Hy elevations relate to ARD elevation within an MS population.
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S. L COSTA, D. B WAKEFIELD, N.D. CHIARAVALLOTI & L. KOSTICH. The Silent Impact of Visual Impairments on Performance of Visual Tests in Multiple Sclerosis.
Objective: Visual and cognitive impairments are frequent in multiple sclerosis (MS). A recent literature review of information processing speed in MS showed that among 157 articles reviewed, only 30% assessed visual function at all, with only 15% formally assessing visual acuity. Symptoms such as convergence insufficiency, double vision, and blurry vision are frequent, but often not specifically assessed and might not be detected by visual acuity tests. Thus the relationship between visual impairments (besides visual acuity) and performance on visual neuropsychological tests (NPT) in MS is unknown and often neglected. The current study examines if individuals with and without visual impairments perform differently on visual and non-visual NPT.
Participants and Methods: Three hundred and twenty two individuals with MS performed 2 visual NPT, the Symbol Digit Modalities Test (SDMT) and the Brief Visual Memory Test Revised (BVMT-R), and 1 non-visual NPT, the California Learning Verbal Test II (CVLT II). All participants underwent a visual assessment performed by an Occupational Therapist.
Results: Participants were divided into 2 groups, those who showed visual impairments ($V_{impaired}$ n= 137) and those who did not (V_{normal} n= 185). Convergence insufficiency was the most prevalent visual impairment (25%), followed by blurry vision (16%), and double vision (6%). There were no significant differences between the 2 groups on age, disease duration or EDSS. An ANCOVA, with age and disease duration as co-variates, showed that the $V_{impaired}$ group performed more poorly on visual NPT (SDMT $p<.01$; and BVMT-R $p<.01$) in comparison with the V_{normal} group, but the 2 groups showed similar performance on the CVLT II. Additionally, strong correlations were found between convergence insufficiency and performance on the SDMT and BVMT-R but not with CVLT II.
Conclusions: The present study highlights the importance of comprehensive visual assessments to fully understand performance on visual NPT by individuals with MS.
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J. LENGENFELDER, H. GENOVA, E. STONE, A. HAIGHT & N.D. CHIARAVALLOTI. Emotional Awareness in Individuals with Multiple Sclerosis.
Objective: To examine emotional awareness in individuals with multiple sclerosis (MS) with and without facial affect recognition (FAR) impairments.
Participants and Methods: 45 individuals with MS were subdivided based on their performance on FAR measure (FEIT, Kerr & Neale, 1993). 15 individuals with MS were impaired in facial affect (score<13) whereas 30 were not. The 2 groups did not differ on age, education, time since diagnosis or ambulation score. All participants received the Levels of Emotional Awareness Scale (LEAS) consisting of 10 scenarios. Each scenario contains two components: a *self* component, where participants are required to describe how they would feel, and an *other* component, where they describe how the other person in the scenario would feel.
Results: Results indicate a significant difference between the individuals with MS with facial affect impairments and those without for the total score on the LEAS ($F(1,44)=5.87, p=.02$) as well as the *self* subscale ($F(1, 44) =6.50, p=.014$), and *other* subscale ($F(1,44) =5.98, p=.019$.
Conclusions: Our data suggest individuals with MS who have difficulty correctly identifying facial emotions may also have difficulty with emotional awareness, or the ability to understand feelings. Additionally these difficulties may exist in interpersonal situations involving both the self as well as others. There is little research examining the relationship between these two constructs in MS, or the impact emotional awareness deficits have on relationships and social outcomes
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C. MAYO, C. LACEY, K. ATTWELL-POPE & J. GAWRYLUK. Fatigue in Multiple Sclerosis: Relationship with Mood and Cognition.
Objective: Fatigue is one of the most commonly reported and debilitating symptoms of Multiple Sclerosis (MS), a chronic disorder of the central nervous system (Zajicek et al., 2010; Heine et al., 2015). The objective of the current study was to explore the relationship between fatigue, mood, and cognition in individuals with MS.
Participants and Methods: Fatigue, mood, and cognition were assessed using the following measures: Modified Fatigue Impact Scale (MFIS; Fisk et al., 1994; Ritvo et al., 1997), Patient Health Questionnaire (PHQ-9; Kroenke et al., 2011), Beck Depression Inventory 2 (BDI-2; Beck et al., 1996), Perceived Deficit Questionnaire (PDQ; Ritvo et al., 1997), Trail Making Test (Reitan, 1955) and Symbol Digit Modalities Test (SDMT; Smith, 1991). Descriptive and correlational statistical analyses were performed with R Studio. Partial correlation coefficients were also calculated to investigate the relationship between fatigue, mood, and cognition, controlling for age.
Results: 15 individuals (12 females) diagnosed with relapsing remitting MS (mean age= 56.87 ± 9.90 years) were included in the analysis. There were significant positive relationships between fatigue (MFIS) and symptoms of depression (PHQ-9: r=0.741, p=0.002; BDI-2: r=0.612 p=0.015) as well as fatigue and perceived cognitive deficits (PDQ: r=0.832, p <0.001). Additionally, there was a significant negative relationship between fatigue and performance on a measure of complex attention/executive function (Trails B: r=-0.550, p=0.033). There were no significant relationships observed between fatigue and simple attention or information processing speed (Trails A: r=-0.348, p=0.204; SDMT: r=-0.022, p=0.939). The relationships between fatigue with mood, and complex attention/executive function remained significant when controlling for the effects of age.

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Conclusions: Individuals with MS, who reported greater fatigue, also reported poorer mood, greater perceived cognitive deficits, and performed worse on a measure of complex attention/executive function.
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R. MULLIGAN, M. BASSO, J. HOFFMEISTER, B. REYNOLDS, D. WHITESIDE & D. COMBS. Polypharmacy and Neuropsychological Function in Multiple Sclerosis.
Objective: Multiple sclerosis (MS) is often treated with multiple medications, the simultaneous use of which may adversely affect cognitive function. Although polypharmacy coincides with cognitive dysfunction in elderly patients, few studies have addressed this possibility in MS. Thelen et al. (2014) found that polypharmacy correlated with cognitive dysfunction in MS, but this study did not evaluate impact of comorbidities, which may have more directly accounted for cognitive dysfunction. The present study examined the concurrent impact of polypharmacy and medical and psychiatric comorbidities on neuropsychological function in MS.
Participants and Methods: Participants included 96 people with MS and 48 healthy people. They were primarily female (74.8%), and Caucasian (90.2%). Participants were administered measures of retrospective, prospective, and working memory, verbal fluency and reasoning, and information processing speed. Participants reported their current medication and medical conditions. A semi-structured interview was conducted to assess psychiatric diagnoses.
Results: Multiple regression evaluated effects of polypharmacy and comorbidities upon cognitive performance, while controlling for demographic and MS-specific disease factors. Tolerances were acceptable and ranged from .90 to .99. Polypharmacy explained more unique variance (*sr*'s ranging from -.19 to -.24) than number of comorbidities (*sr*'s ranging from .01 to .17) in domains of working memory and information processing speed. Other domains of function were not predicted by either variable.
Conclusions: Polypharmacy was associated with decline in working memory and information processing speed. Presence of comorbidity conditions did not account for neurocognitive dysfunction. Such findings may help clinicians more effectively weigh the costs and benefits of multiple medications, especially in populations with multiple comorbidities. Future studies may elaborate on the effects of polypharmacy and other comorbidities on various neuropsychological domains in MS.
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G.Y. NAVARRO, C. HICKEY, I. PANYAVIN, M. AZAR & M.T. SCHULTHEIS. The effects of added interventions in a cognitive- based rehabilitation in persons with M.S.
Objective: Prior research has identified cognitive impairment as a barrier to vocational functioning for individuals with Multiple Sclerosis (MS). The current study examined the efficacy of two cognitive-based rehabilitation adaptations to improve vocational functioning in MS using the Vocational Multitasking Test (VMT). The adaptions include: 1) increasing time allotted (VMT Time) and 2) introducing a structured planning phase before task initiation (VMT Plan). It was hypothesized that adaptations would improve performance and that VMT-Time would be associated with greater improved performance.
Participants and Methods: As part of a larger study, persons with clinically defined MS (n=37) were administered the VMT across two time points. At time point 1, participants were administered the standard VMT. At time point 2, participants were randomly assigned to either plan (n=12) or time (n=25) adaptation. Paired sample t-tests assessed for change in VMT performance across each condition. A difference score in total points was calculated between standard and adapted VMT. Then, an independent sample t-test with difference scores as the dependent variable was calculated to determine which adaptation was associated with the most improvement in performance.
Results: In the VMT-Time group, VMT performance significantly improved at time point 2, $t(24)=-6.39, p<.05$. However, VMT-Plan was not associated with a significant change in performance at time point 2. Participants administered VMT-Time showed more improvement between time point1 1 and 2 relative to VMT-Plan, $t(26.95)=2.28$, $p< .05, d=.77$.
Conclusions: Results demonstrate that vocational functioning performance improves when individuals with MS are provided with additional time versus planning prior to initiating tasks. Additional research is needed to better understand the relationship between these interventions, which may have implications for workplace accommodations for individuals with MS.
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E. PASTERNAK & F. FOLEY. Exploring the relationship between cognitive reserve and cognitive fatigue in multiple sclerosis: a cross sectional retrospective study.
Objective: Fatigue is one of the most prevalent and disabling symptoms in multiple sclerosis (MS). In light of research demonstrating the contribution of cognitive reserve (CR) to differential vulnerability to disease related cognitive decline in MS, the present study applied the concept of CR to the study of cognitive fatigue in MS. In keeping with the conceptualization of cognitive fatigue as deteriorated performance over acute sustained mental effort, and its operationalization as decline in performance over time, cognitive fatigue was measured via productivity change on the SDMT. It was hypothesized that greater CR would be associated with less of a cognitive fatigue effect on the SDMT.
Participants and Methods: Participants were individuals with clinically definite MS who were referred for neuropsychological testing by the clinic neurologist at the MS Center at Holy Name Medical Center in New Jersey. Data was collected as part of an ongoing research study examining cognitive and psychosocial outcomes in MS.
Results: In keeping with conceptual and operational definitions of cognitive fatigue employed here, decline in performance over time was observed over the course of the oral SDMT. Consistent with the CR hypothesis, higher CR was associated with greater overall productivity on the SDMT. Further, CR moderated cognitive fatigue during the SDMT as hypothesized; high CR individuals exhibited greater maintenance (i.e., less decline over time) and optimization (i.e., less variability over time) of cognitive performance, compared to low CR individuals.
Conclusions: These findings suggest differential susceptibility to cognitive fatigue above and beyond MS status based on premorbid CR factors. Thus, CR factors may contribute to identification of individuals at greater risk for behavioral manifestation of cognitive fatigue. Findings also point to the importance of future research examining an association between ongoing CR and cognitive fatigue as an area for clinical intervention.
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J. PORTNOY, J. COHEN, A. NAJJAR & F. FOLEY. Errors on the Symbol Digit Modalities Test and Performance Validity in Multiple Sclerosis.
Objective: The Symbol Digit Modalities Test (SDMT) is widely used in cognitive screening of patients with multiple sclerosis (MS). This research aimed to evaluate whether the number of errors committed on the SDMT was associated with MS patients' odds of passing a free-standing performance validity test.
Participants and Methods: 216 patients with MS underwent neuropsychological testing using a battery that included the SDMT and the Test of Memory Malingering (TOMM). Mean age of the sample was 48.1 years, and mean education was 14.7 years. 76% of patients were female. Mann-Whitney *U* test was conducted to compare the number of SDMT errors committed by those who passed versus failed the TOMM.

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Odds ratios were calculated for passing the TOMM at cutoffs of two and three SDMT errors.
Results: 192 patients (88.9%) provided valid performance according to the TOMM. Patients who passed the TOMM committed significantly fewer errors on the SDMT ($M = 1.02$) than those who failed ($M = 2.38$; $p = .014$). Odds of failing the TOMM were significantly greater at a cutoff of two or more errors on the SDMT (OR = 3.80, $p = .003$) and at a cutoff of three or more errors (OR = 5.58, $p < .001$).
Conclusions: Higher numbers of errors on the SDMT are associated with greater odds of subthreshold performance validity in MS. When the SDMT is administered for cognitive screening purposes in this population, clinicians should consider the increased possibility of invalid performance in patients who commit at least two errors.
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A. RAPHAIL & M.T. SCHULTHEIS. The Impact of Cognitive and Motor Functioning as Driving Demands Increase in Individuals with Multiple Sclerosis.
Objective: Multiple sclerosis (MS) causes cognitive and motor deficits that can impact driving ability, though previous research findings have been disparate. This may be due to high variability among people with MS and different methods of assessing driving. The aim of this study was to examine the impact of cognitive and motor ability on sensitive driving tasks with varying levels of complexity.
Participants and Methods: 40 people with MS and 29 healthy control (HC) individuals drove in a virtual reality driving simulator (VRDS). VRDS challenges included 1) basic open-highway driving, 2) avoiding a boy running into a street, 3) truck-following, and 4) a dual driving/verbal memory task. Executive function, processing speed, and upper and lower extremity functioning were assessed.
Results: Multiple linear regressions were calculated for each driving task. During basic driving, processing speed was a significant predictor of lane position variability, $F(5, 48)=3.60$, $p<0.01$, $R^2=0.27$. During the boy task, lower extremity function was predictive of distance from the center of the lane at closest approach to the boy, $F(5, 42)=3.43$, $p=0.01$, $R^2=0.29$. Worse executive function and lower extremity function were predictive of increased variability in distance from the truck in the following task, $F(5, 54)=4.06$, $p<0.01$, $R^2=0.29$. In the verbal memory task, worse executive functioning was a significant predictor of increased variability in driving speed, $F(5, 40)=2.66$, $p=0.038$, $R^2=0.28$.
Conclusions: These findings demonstrate how the influence of cognitive and motor functioning varies based on driving demands. As task demands increased, higher level cognitive and motor functioning became predictive of driving performance. Therefore driving capacity needs to be assessed using complex driving metrics to sufficiently capture the effects of MS symptoms. Furthermore, thorough cognitive and motor assessment is necessary in order to predict aspects of driving that may be impacted and provide individualized recommendations.
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Movement and Movement Disorders

F. SACCÀ, T. COSTABILE, C. PANE, A. REIA, A. SALVATI, D. AURISICCHIO, G. DE MICHELE & A. FILLA. Normalization of Timed Neuropsychological Tests with the PATA Rate and Nine-Hole Pegboard Tests in Parkinson's Disease and Multiple System Atrophy.
Objective: Timed neuropsychological tests do not take into account physical impairment during scoring procedures. Dysarthria and upper limbs impairment can be easily measured with the Pata Rate Task (PRT) and on the Nine-Hole Pegboard Test (9HPT). We recently validated a normalization method for timed neuropsychological tests using the PRT and 9HPT (p9NORM). We now validate the p9NORM in Parkinson's Disease (PD) and Multiple System Atrophy (MSA).
Participants and Methods: We enrolled twenty-six patients with PD, eighteen patients with MSA, and fifteen healthy controls (HC). p9NORM was applied to patients with abnormal PRT or 9HPT. We analyzed the difference before and after p9NORM with the Wilcoxon test. Differences between three groups were tested with the Kruskal-Wallis test and with the Mann-Whitney as a post-hoc with Bonferroni correction.
Results: No differences emerged in demographics across groups: (PD: age 66±8; education 9±4 years;; MSA: age 60±8; education 10±4 years; HC: age 61±12; education 9±4 years). p9NORM significantly improved the TMTA (p=0.003), TMTB (p=0.018), AM (p=0.042) for MSA patients; TMTA (p<0.001), TMTB (p=0.001), AM (p=0.001) for PD. MSA patients performed worse than HC at all tests, whereas PD patients performed worse at the SDMT (p<0.001), AM (p=0.004), SF (p=0.002), PF (p=0.006), with similar scores at the TMTA and TMTB. When comparing MSA with PD, the SDMT, AM, PF, SF showed no differences. In contrast, TMTA raw scores were different between groups (p=0.006), but the difference lost significant after p9NORM correction (p=0.100). The same happened for the TMTB (p=0.034 vs 0.186).
Conclusions: We confirm that the p9NORM can be used successfully in PD and MSA patients, and that it improves the performance of most timed test. This mitigates the impact of disability on their result that can be critical with small effect sizes that typically occur in rare diseases.
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Multiple Sclerosis/ALS/Demyelinating Disorders

F. SACCÀ, T. COSTABILE, C. BASILE, S. FERRARO, A. BARBARULO, E. SIGNORIELLO, G. LUS & V. BRESCIA MORRA. The impact of cognitive testing on disability measurement during the follow-up of people with Multiple Sclerosis.
Objective: Cognitive tests are not routinely performed during disability evaluation of MS. We previously showed that the integration of the Brief International Cognitive Assessment for MS (BICAMS) and orientation tests (OTs) in the EDSS (iEDSS) resulted in an improvement of disability measurement in 25% of cases. Objective of our study was to evaluate the impact of the iEDSS, and the weight of single functional systems (FS) on disability measurement during a two-year follow-up.
Participants and Methods: To determine the weight of single FSs, we selected patients with worsened follow-up iEDSS and calculated the iEDSS either including all FSs, or by excluding one FS at the time. We obtained eight different follow-up iEDSSs (each for every missing FS), and calculated the number of worsenings imputable to each FS.
Results: We studied 371 patients with complete iEDSS and cognitive measures at baseline and 2-year follow-up. Baseline variables were: iEDSS 3.77±1.7 (0-7.5), age 43.1±11.6 (14-71), female 68.5%. After 2 years, 125 patients (33.7%) showed a worsening in their iEDSS score, with a mean change of +1.03±0.7 (range 0.5-4). The cognitive-FS worsened in 27 patients (7.3%) with a mean change of +1.2±0.4. We found a higher impact on EDSS change caused by ambulation (56.8%), followed by cognitive-FS (18.4%), pyramidal (18.4%), sensory (16%), bowel/bladder (12%), cerebellar (4.8%), brainstem (4%), visual (1.6%).
Conclusions: We show that cognition is the most impacting FS, after ambulation, on disability progression. We recommend that neuropsychological tests be performed at the same time of the EDSS to allow a more accurate determination of disability progression.
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G. SPADONI, M. PRESENTI, S. TOCCHINI & M. TIMPANO SPORTIELLO. Amyotrophic Lateral Sclerosis (ALS) and Primary Lateral Sclerosis (PLS): the differences in cognitive functioning and in emotional recognition Giulia Spadoni[2], Maria Luisa Presenti[2], Marco Timpano and Stefania Tocchini[1 2 1] Public Health Authority ASL Nordovest della Toscana [2] University of Pisa.

Objective: Several studies show that patients with Amyotrophic Lateral Sclerosis (ALS) and with Primary Lateral Sclerosis (PLS) have a cognitive impairment, particularly in executive functions, language and emotional recognition deficit. Our study aims to assess at baseline and after 12 months neuropsychological functioning in ALS and PLS patients.

Participants and Methods: 15 patients: 9 ALS (M 6), 6 PLS (F 4) and 17 (F 10) age-matched healthy controls (HC). We usedstandard a set of neuropsychological tools to asses all cognitive domains and Amyotrophic Lateral Sclerosis Functional Rating Scale (ALS-FRS) for screening physical variables. We examined the recognition of basic emotions (disgust, anger, fear, sadness and happiness) using two batteries for emotional recognition: Facial Emotion Recognition Battery (FERB) and the Emotional Prosody Recognition Battery (EPRB). Moreover, we used a Wechsler Memory Scale- Forth edition to assess memory profile only on patients with no important motor impairment.

Results: The scores in executive tests, particularly Phonemic Fluency Test, were significantly lower in PLS than in HC ($p<.05$) and ALS patients differ from HC in Boston Naming Test ($p<.05$), particularly in number of anomie ($p<.01$). Within experimental group there are not statistically differences. Moreover, ALS patients have more difficulties in the recognition of emotions from auditory stimuli than facial expression ($p<.05$); particularly the recognition of sadness is impaired significantly in ALS patients than HC ($p<.05$). Follow-up shows cognitive deterioration in clinical groups.

Conclusions: : Our results confirm an impairment in executive functions (prefrontal-dorsolateral cortex) in PLS patients and in language in ALS patients (lexical retrieval). Furthermore they suggest presence of dissociation in emotional recognition, between auditory(EPRB)and visual stimuli (FERB). Finally, we recommend a continuous cognitive evaluation, seeing as ALS not implicate only motor impairment but it represents a complex disease.

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M. STIMMEL, S. SCHNEIDER, J. COHEN & F. FOLEY. Feasibility of an Intervention to Address Loss of Employment for Women with Multiple Sclerosis.

Objective: Multiple sclerosis (MS) affects over 500,000 Americans. Unemployment is prevalent in MS, especially in women, and is associated with economic stress, poor self-efficacy and lower quality of life. The present study (April 2016-June 2017) assessed feasibility of an ongoing study seeking to help women with MS maintain employment through the use of early screening and neuropsychological intervention. Enrollment, dropout rates, and acceptability of this study were evaluated.

Participants and Methods: Women at an MS center in Teaneck NJ, who met validated cut-off criteria on measures of fatigue (FSS), cognition (SDMT), and depression (HADS or PHQ) were included in a randomized intervention and received neuropsychological testing, a report with recommendations, and for the experimental group, in-person feedback and calls from a care-coordinator.

Results: Of the 111 employed women approached, 81 (73%) agreed to undergo screening. From 71 women who met inclusion/exclusion criteria at screening, 49 (69%) met cut-off criteria on at least one measure. Whereas 8% (n=6) met criteria on the SDMT, 27% met criteria on the HADS/PHQ and 63% met criteria on the FSS. A total of 30 women completed the intervention (control=14; experimental=16), yielding a 39% dropout rate (no statistical difference between groups). Nearly all participants (97%) reported benefit from participation. The majority (92%) of the experimental group who recalled receiving phone calls (12/13) found the care-coordinator helpful.

Conclusions: Findings support that studying and providing treatments for this busy population (employed women with MS) is feasible, acceptable, and necessary given that a significant percentage of women reported fatigue and mood symptoms. It is also notable that only 6 women met criteria on the SDMT, despite findings of cognitive deficits in more women (12/30). Thus, the previously validated cut-off of ≤40 on the SDMT is inadequate in identifying employed women with MS at-risk of cognitive dysfunction who may benefit from intervention.

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M. STIMMEL, J. COHEN, S. SCHNEIDER & F. FOLEY. Use of In-Person Feedback and Care-Coordinator to Increase Adherence to Neuropsychological Recommendations in Women with Multiple Sclerosis.

Objective: Adherence to recommendations made following neuropsychological testing is low in people with multiple sclerosis (MS). Although completing these recommendations (e.g., psychotherapy, cognitive rehabilitation, occupational therapy) has been found to benefit symptom management and improve overall functioning, noncompliance prevents these potential benefits. The present study is part of a larger study seeking to help at-risk women with MS maintain employment through the use of a neuropsychological testing intervention. In-person feedback and two calls from a care-coordinator were evaluated as potential tools for improving adherence to recommendations.

Participants and Methods: In the present study, participants were randomized to receive either standard care (a report with results from neuropsychological testing in the mail and phone feedback; n =14) or to receive an experimental treatment (in-person feedback of results and two calls from a care-coordinator to assist with follow through of recommendations; n=16). At one year, participants reported on whether they had completed the given recommendations.

Results: Overall adherence to recommendations was 31% in the control group and 46% in the experimental group ($p= .240$). Notably, participants in the experimental group were more likely to complete at least some of their recommendations as compared to the control group ($p=.031$). When comparing various time points, significantly more recommendations were completed by the experimental group after receiving two calls from a care-coordinator ($p=.002$) as compared to only one or no calls.

Conclusions: Thus, in-person feedback and two calls from a care-coordinator appear to be very useful for improving adherence to neuropsychological test recommendations. Neuropsychologists may consider these as possible avenues for improving compliance, thus allowing patients to have the full benefit from completed recommendations.

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L. STROBER, J. BRUCE, P. ARNETT, K. ALSCHULER, C. BOMBARDIER, M. DI BENEDETTO, A. LEBKUECHER, J. THELEN, C.A. F. ROMAN, J. SMITH, M. GLUSMAN, S. REEVES, E. GUTY & R. COOPER. Normative Data of the Oral Symbol Digit Modalities Test: An Update.

Objective: The Symbol Digit Modalities Test (SDMT) has been touted as the most sensitive measure of MS-related cognitive impairment and is a significant predictor of various outcomes in MS (e.g., employment). While the measure is extremely sensitive, the oral administration of the SDMT, which is the typical administration in MS, has never been normed. Rather, the existing norms include a written administration followed by an oral administration, meaning that the oral norms are in fact a repeat test. More importantly, the present normative data are extremely outdated (over 40 years old) and do not take into consideration gender, and only dichotomize education as greater than or less than a high school education.

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Participants and Methods: Given this, we have been developing new norms for the oral SDMT in a multi-site nationally representative study in which age, gender, and education are taken into consideration. To date, 657 of the projected 720 participants have been enrolled.
Results: Findings thus far suggest a fairly significant effect for age (d's = .55 to 1.55) and gender (d's =.51 to .68). Among the age brackets in which gender played a role, the overall mean difference between men and women was found to be 5.1 (favoring women), a clinically meaningful difference in the MS literature that to date has not been considered.
Conclusions: Gender and age need to be considered with SDMT oral norms that is not taken into account with present norms. This presentation will present preliminary normative data as well as demonstrate the clinical utility in using these updated norms.
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R. WILLIAMS, C. HICKEY, M. AZAR, T. LEIST, C. SCOTT & M.T. SCHULTHEIS. Employment Status and Vocational Multitasking Performance in MS.
Objective: Unemployment is reported at 50 to 80% within 10 years of multiple sclerosis (MS) diagnosis, and is associated with emotional distress, physical dysfunction and social difficulties. Elucidating the relationship between cognition and vocational functioning in this population is essential to developing targeted rehabilitation strategies. The current study examines the relationship between employment status and multitasking ability in participants with MS using the Vocational Multitasking Test (VMT).
Participants and Methods: Persons with clinically defined MS (n = 53) completed the VMT as part of a larger study. 53% (n=26) of participants were employed (E) and 47% (n= 23) were unemployed (UE). VMT Total Score, Total Errors, Task Changes, and Simultaneous Task Attempts were calculated. Between-group analyses were performed among MS participants, using employment status as a binary grouping variable.
Results: Independent-samples t-tests revealed that VMT Total Points were higher for the E group (M=36.42, SD=12.56) compared to the UE group (M=26.33, SD=13.74), $t(41) = -2.65$, $p = .01$. Additionally, UE participants (M=3.58, SD = 1.67) changed tasks less frequently compared to E participants (M=4.67, SD = 2.17), $t(49) = -1.98$, $p = .05$. Simultaneous tasks attempted and total errors did not significantly differ between groups.
Conclusions: Overall, results suggest an association between employment and multitasking ability in those with MS. Employed participants completed more VMT task steps and task changes than unemployed participants. This suggests that employment in MS is associated with superior multitasking ability characterized by greater productivity, although not improved accuracy, and more frequent alternating between sub-tasks when working towards an overall goal. This line of research has the potential to elucidate the cognitive deficits which contribute to unemployment in the MS population, and support the development of targeted rehabilitation strategies.
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Stroke/Cerebrovascular Injury & Disease (Adult)

N. TORRO-ALVES, E. LIMA, D. SANTANA & Á. SOUSA. Post-stroke brain asymmetry in the recognition and discrimination of dynamic facial expressions.
Objective: Several studies have investigated the effects of brain damage on emotional processing; however, results are still contradictory in regard to the role of brain hemispheres in facial emotion recognition. Most studies have focused on static instead of dynamic displays of faces, underestimating the importance of motion in the process of emotional evaluation. Here, we investigated the recognition and discrimination of dynamic facial expressions of happiness, sadness, surprise, anger, fear, disgust, pain, and neutral affect in patients with right brain damage (RBD) and left brain damage (LBD) following stroke and control volunteers (CV).
Participants and Methods: Participants included 6 RBD and 8 LBD patients and 12 CV. In the recognition task, subjects classified dynamic facial expressions according to eight response options. In the discrimination task, subjects judged whether pairs of faces expressed the same or different emotions.
Results: A one-way ANOVA showed that LBD participants performed worse in the recognition task (50,47%) compared to RBD (70,90%) participants and CV (69,78%) ($p<0.05$). A *post hoc* test indicated that the LBD group had lower recognition scores for painful and angry faces compared to CV, as well as more errors in the recognition of fear, sadness, and pain than the RBD group ($p<0.05$). In the discrimination task, the LBD group (72,87%) had a worse performance compared to CV (85,50%) ($p<0.05$).
Conclusions: These findings do not support the main theories on brain asymmetry. However, we noticed that LBD as compared to RBD group presented more neurological deficits as assessed with the National Institute of Health Stroke Scale (NIHSS). It is important to point out that participants were evaluated with regard to the recognition of dynamic facial expressions, which can be considered as having greater ecological validity than static faces and, therefore, more similar to the real conditions of social interaction.
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Neurostimulation/Neuromodulation

N. TORRO-ALVES, G.A. MELO, J.D. MARINHO, M.L. MADRUGA, S.M. ANDRADE & E.A. OLIVEIRA. Effects of transcranial direct current stimulation on frontal alpha2 oscillations in women with fibromyalgia.
Objective: Pain is a subjective experience and its evaluation and treatment are still a challenge. Transcranial direct current stimulation (tDCS) has presented satisfactory results in the clinical setting of patients with Fibromyalgia. Here, we evaluate the effects of tDCS on alpha2 oscillations (10-12 Hz) in women with fibromyalgia.
Participants and Methods: 31 women with clinical diagnosis of fibromyalgia, aged between 27 and 58 years old, were divided into three groups: (1) active stimulation during five consecutive days, (2) active stimulation during 10 consecutive days, and (3) simulated stimulation (sham) for five consecutive days. Patients were evaluated with an EEG 32 channel, sampling rate of 500 Hz, reference electrodes in the mastoid and impedance was maintained below 20kΩ. The present study consisted in a double-blind, randomized, and placebo-controlled clinical trial.
Results: Mean age of participants was 44.81 years old (SD = 8.8), with an average time of diagnosis of fibromyalgia of 79.77 months (SD = 64.64). In the statistical analysis, for the spectral power average, a factorial ANOVA with mixed design showed an interaction effect between time and group on the frontal alpha2 frequency range

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[F(1,28) = 5.545; p <0.05]. Sidak's *post hoc* revealed that this difference was significant only for groups 1 and 3, with effect sizes of d = 0.40 and d = 0.50, respectively.
Conclusions: We observed an increase in the spectral amplitudes of alpha2 frequency range (10-12 Hz) in the frontal region, reflecting a greater synchronization of this activity after stimulation. Studies have shown that the alpha band is related to relaxation. Therefore, the synchronization of the cortical electric activity promoted by tDCS is possibly associated with a relaxation state in patients with fibromyalgia.
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Other

J.A. LAFO, S. CORREIA, M. BORGIA, F. ACLUCHE & L. RESNIK. Cognitive Characteristics of Investigator- vs. Self-Withdrawn Participants in a Study of Advanced Upper Limb Prosthetic Device Use.
Objective: The DEKA Arm is an upper limb prosthesis offering advanced functionality relative to existing devices. Utilizing the DEKA Arm may be more cognitively demanding than using traditional upper limb prostheses because of its greater number of powered movements. Accordingly, assessment of users' cognitive status may be important in identifying appropriate DEKA Arm candidates to ensure optimal independent use, safety, and cost-effectiveness. This study examined neuropsychological test performance among participants enrolled in the VA Home Study of the DEKA Arm who were prematurely withdrawn from the study.
Participants and Methods: The sample included 24 adult upper limb amputees who were withdrawn during the on-site laboratory training phase of the study. Study withdrawal was classified as participant-initiated (W-P, n = 18) or investigator-initiated (W-I, n = 6). All participants underwent baseline neuropsychological evaluation. Objective cognitive test results did not influence investigators' withdrawal determinations. Wilcoxon rank sum tests and Fisher's exact tests were used to compare demographic characteristics and test scores.
Results: The groups did not significantly differ in terms of baseline demographic characteristics. Compared to W-P participants, W-I participants had significantly worse scores on measures indexing processing speed, cognitive set-shifting, and encoding of contextual and non-contextual verbal information (p < .05 for all comparisons).
Conclusions: Participants identified by rehabilitation specialists for withdrawal had lower scores on measures engaging frontally-mediated cognitive skills relative to those who self-withdrew. These findings raise the possibility that frontal-executive functioning may in some way impact individuals' ability to appropriately participate in a demanding clinical trial involving skilled advanced prosthetic use. We propose that neuropsychological evaluation may represent an integral component of future clinical guidelines for advanced prosthetic prescription.
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C.G. QUINN & P.J. MATTIS. Predicting verbal and non-verbal learning in Parkinson's disease.
Objective: Cognitive dysfunction in Parkinson's disease (PD) is common and has been associated with a specific neural network that is discernable from that of Alzheimer's disease (AD), although these pathologies can co-exist. Previous research showed that patients with PD often exhibit deficits on California Verbal Learning Test-II (CVLT), which correlate to the FDG-PET biomarker of cognitive functioning in PD (PD cognition-related pattern; PDCP). Although highly correlated to the CVLT, the Brief Visuospatial Memory Test-Revised (BVMT) is not related to PDCP; instead, it is correlated with a biomarker sensitive to cognitive functioning in AD (AD-related pattern; ADRP). This study aimed to assess which aspects of cognition best predict performance on CVLT and BVMT in order to elucidate this recently identified discrepancy in learning ability.
Participants and Methods: We studied 50 subjects with PD (age: *M*=62.12, *SD*=9.65; education: *M*=15.96, *SD*=2.70, Total DRS score: *M*=138.48, *SD*=4.76). Two exploratory stepwise linear regressions were conducted with measures of visuospatial ability (Judgment of Line Orientation, JLO), language (Boston Naming Test), and executive function (Wisconsin Card Sorting Test perseverative errors, WCST-PE; Tower Test Move-Accuracy-Ratio) as predictors of CVLT and BVMT sum of learning trials.
Results: Results revealed that WCST-PE best predicts CVLT performance, $F(1\ 38)=4.74$, $\beta=-.33$, $p=.036$, accounting for 11% of variance, $R^2 = .11$. JLO best predicts BVMT performance $F(1,38)=10.71$, $\beta=.47$, $p=.002$, accounting for 22% of variance, $R^2 = .22$.
Conclusions: Findings suggest that executive function is more strongly associated with verbal learning, while visuospatial ability is more strongly associated with non-verbal learning in adults with PD. Results inform our observation of differing performance on CVLT and BVMT in patients with PD and help disentangle the association between cognitive function and network pathology in this population.
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G. VINGERHOETS, R. GERRITS & S. BOGAERT. Mirrored Organs, Mirrored Brains? Brain Organization in Human Situs Inversus Totalis.
Objective: Lateralization is an important organizational principle in biology and relations between different manifestations of asymmetry help elucidate its underlying mechanism. Situs inversus totalis (SIT) is a rare condition in which thoracic and abdominal organs show a complete left/right reversal. In animals, SIT has been associated with reversed brain and behavioral asymmetries but in humans findings have been contradictory. We aimed to evaluate brain functional organization in a relatively large sample of SIT.
Participants and Methods: We used fMRI to investigate brain functional asymmetries in 15 participants with SIT and 15 control participants individually matched for sex, age, education, and handedness. We assessed neural responses to functional localizers of word generation and tool pantomiming (typical left hemisphere functions) and spatial attention and face recognition (typical right hemisphere functions).
Results: While most participants revealed typical brain organization, atypical functional segregation (with one or two functions showing atypical lateralization) was significantly more frequent in participants with visceral reversal. Interestingly, two left handers (one SIT and one control) showed complete reversal of all cognitive functions regardless of visceral organization and thus maintained typical functional segregation but as a mirror image of a typical right hander. Cognitive performance, as measured with a neuropsychological test battery (RBANS), was significantly predicted by the degree of atypical functional segregation. Increased deviation from typical functional segregation paired with lower cognitive performance.
Conclusions: The findings suggest that (1) SIT-participants show increased frequency of atypical functional segregation and that (2) typical functional segregation may reflect an optimal evolutionary solution with deviations being associated with reduced cognitive performance.
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Stroke/Cerebrovascular Injury & Disease (Adult)

L. ARADER, M. CHAPLIN, V. WILKINS, S. BANERJEE, G. ALEXOPOULOS & D. KANELLOPOULOS. Relationship Between Subtypes of Post-Stroke Depression and Neuropsychological Profiles in Older Adults.

Objective: The emotional and cognitive sequelae of post-stroke depression (PSD) often contribute to poor functional outcomes. However, PSD may phenomenologically and pathophysiologically differ from depression in patients without stroke. Characterizing subtypes of depression and elucidating their relationship with cognition may help identify meaningful treatment targets for individualized PSD interventions. The aim of the present study was therefore to characterize the relationship between neuropsychological and depression profiles in patients with PSD.

Participants and Methods: Our sample consisted of 135 non-demented individuals over the age of 50 diagnosed with major depression (≥18 Montgomery Asberg Depression Scale (MADRS)) following a stroke. Neuropsychological assessment at the time of study entry included normatively scored measures in the following cognitive domains: Executive function, Processing Speed, Attention, Immediate Memory, Delayed Memory, and Language. Factor analysis was applied to MADRS items to derive post-stroke depression subtypes. The relationship between neuropsychological domains and depression subtypes was assessed using Spearman correlations.

Results: Four distinct subgroups of PSD emerged in our factor analysis (Sadness, Anxiety, Anhedonia, and Suicidality). Only Anhedonia was significantly related to performance in neuropsychological measures. Specifically, more severe anhedonia was related to worse general cognitive functioning, executive dysfunction, and poor learning and memory performance.

Conclusions: PSD may represent a heterogenous illness with differing symptom presentation. Among depression subtypes, anhedonia was the only subtype related to poor cognitive function. As such, anhedonia may represent a pathophysiologically meaningful presentation of PSD that is potentially related to worse cognitive outcomes for these patients. Further research examining cognitive interventions and neuroanatomical correlates for patients with PSD and prominent anhedonia is warranted.

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B.C. BAUGHMAN, E. WILLIAMSON, J. GOYANES & A. STANFILL. Neuropsychological Function in Survivors of Aneurysmal Subarachnoid Hemorrhage.

Objective: Aneurysmal subarachnoid hemorrhage (aSAH) is a rare stroke variant representing only 5% of all strokes but with a disporpotionatly high mortality rates of approximately 50%. aSAH neuropsychological investigations are less common than other stroke mechanisms, likely due to the high mortality/morbidity rates. Select studies have shown neuropsychological deficits in patients who are normal on general outcome scales (Scott et al., 2010). Yet, questions remain as to the salient predictors of neuropsychological outcome. The current study examined neuropsychological function in a diverse, aSAH survivor group, controlling for a wide set of demographic factors and aSAH specific factors.

Participants and Methods: Retrospective review revealed 51 subjects with aSAH, who completed post-hospitalization neuropsychological testing. Age/sex distributions were consistent with national trends (M =51.32; Female=76%), with equal racial representation African-American (47%). Days post-aSAH varied (M=471.47). Most subjects were employed (55%). Most aneurysms were in the anterior circulation (92%), a majority being treated with surgical clipping (55%). Cognitive scores were transformed to standardized z-scores. An overall cognitive composite and individual domain scores were generated. ANOVA and T-tests were utilized to examine differences across aneurysm location and other demographics.

Results: 38% of the sample was impaired (M=-0.90, SD=0.71). Cognition did not differ across aneurysm locations (F=1.00, $p<.436$), psychotropic use (t (48)=.68, $p<.49$), or employment status (F=0.41, $p<.99$). Time post-SAH and cognition were not significantly correlated ($r=-0.97$, $p<.51$).

Conclusions: The current study showed neuropsychological deficits, albeit mild, in aSAH patients. Anterior circulation patients tended to underperform relative to posterior patients. Findings are consistent with studies showing deficits in otherwise functional normal patients. Clinical implications will be addressed.

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C. BAYER, L. HOYMAN, J. MURTHY, M. QUIRK & J. ROBBINS. The Development of and Clinical Utility of a Neuropsychological (NP) Stroke Protocol and Interventions for Patients in an Inpatient Acquired Brain Injury (ABI) Rehabilitation Setting.

Objective: To provide a review of the development of and six-month preliminary outcome review following implementation of an inpatient rehabilitation stroke NP protocol.

Participants and Methods: A standardized stroke protocol was developed incorporating NP testing based on Neurological Disorders and Stroke-Canadian Stroke Network (NINDS-CSN) guidelines. Patients admitted to the ABI unit received pre and post NP testing. The group receiving testing alone comprised the Treatment as Usual group (TAU; N = 11 Age M=47.91, SD=16.24). The Intervention group (IG; N = 8 Age M=50.50, SD=11.74) received evidence-based (EB) interventions (i.e., psychoeducation and mindfulness-based practices) in addition to testing. Overall test battery mean (OTBM) and PHQ-9 scores were examined at pre and post testing between both groups.

Results: Between-groups ANCOVAs were used to examine differences in post-test OTBM and PHQ-9 (pre-testing scores as the covariate). There were no significant differences between IG and TAU on the OTBM F(1, 35) = .37, p=.55 or PHQ-9 scores F(1, 9) = 2.97, p=.12. TAU OTBM mean scores were 39.69 and 39.70. IG OTBM mean scores increased from 36.01 to 39.79. For the PHQ-9, both IG and TAU scores decreased (IG: 8.33 to 2.00; TAU: 7.30 to 4.33).

Conclusions: There is need for EB models of care incorporating neuropsychology into poststroke rehabilitation to improve patient outcomes by addressing the cognitive and emotional sequalae of stroke. Although our preliminary outcome data did not yield statistically significant results between groups, comparison of mean scores suggests the IG performed better for OTBM and PHQ-9. The small sample size is a significant limitation of the study. Given the significant within-group variability in stroke patients (i.e., stroke type, severity, etc.), modifying treatment protocols based on these factors may provide insight for tailoring stroke rehabilitation.

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A.D. BONO, C.M. MULLEN, E. TRAN, S. HOLLIS, T.A. NOVACK & A. KNIGHT. An Efficient Battery to Assess Readiness for Driving after Stroke.

Objective: In the rehabilitation setting, an efficient neuropsychological battery for assessing driving safety after stroke is needed. This study examined the contribution of individual cognitive measures within a driving battery for a consensus determination of readiness to return to driving.

Participants and Methods: This was a retrospective study of stroke patients (n=39) seen at UAB Spain Rehabilitation Center who expressed an interest in return to driving. Cognitive measures included Useful Field of View (UFOV), Stroke Drivers Screening Assessment (SDSA),

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Delis-Kaplan Executive Function System Trail Making Subtest (DKEFS-TMT), Neuropsychological Assessment Battery (NAB) Driving Scenes and Map Reading subtests. Evaluation decisions (pass or fail) were determined separately by 3 neuropsychologists. Consensus decisions were achieved for 82% of the participants. Only participants (n=32) with consensus across all neuropsychologists were included in the model.

Results: Binomial logistic regression models were run with evaluation decision as the dependent variable, and individual tests as predictive variables. Classification accuracy based on individual tests: UFOV Category: 93.8%; SDSA Compass: 81.3%; SDSA Road Signs: 71.9%; NAB Driving Scenes: 65.6%; NAB Map Reading: 78.1%; and DKEFS TMT Number Letter Sequencing; 87.5%. In each case, combining one of the driving measures with the UFOV achieved 100% classification. As the UFOV is a computerized task that may not be used in other settings, we looked at the best combination of manually administered tests and found that NAB Map Reading, NAB Driving Scenes, and aspects of the DKEFS TMT achieved a 96.9% classification rate.

Conclusions: UFOV had the highest classification rate as a stand-alone measure, suggesting that the 3 neuropsychologists viewed this measure as an accurate and efficient way to assess driving safety. However, the combination of other measures also achieved a high classification rate, suggesting that one may accurately assess driving safety with other measures.

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B.J. DIAMOND, J. DELUCA, K. HAPPAWANA, W. TSANG & S. KRESSEL. Discriminating Confabulations from Truths in Anterior Communicating Artery (ACoA) Aneurysm Using Autonomic Indices.

Objective: Confabulation has been categorized as either provoked or spontaneous. Provoked is viewed as a normal response to faulty memory and spontaneous involves fantastic or unprovoked falsehoods. It is a disorder in awareness, retrieval, and/or memory-executive function associated with orbitofrontal involvement. Our goal was to determine if confabulations could be discriminated from accurate information using physiological indices.

Participants and Methods: XP was a 61-year-old male who suffered an ACoA aneurysm rupture and subsequent subarachnoid hemorrhage. CT showed infarcts affecting basal forebrain, right basal ganglia and inferior fronto-parietal regions. XP's Logical Memory (LM) score was compared to 11 ACoA's. At 10 weeks post, XP was given a computer task using autobiographical and previously elicited confabulatory responses. Blood Pressure (BP) and mean arterial pressure (MAP) were continuously recorded.

Results: On four incorrect selections, an autonomic index score showed that in response to correct but unselected options, systolic, diastolic and MAP were significantly lower than incorrect but selected response options ($t(2) = 4.8, p = .02$). Change in mean systolic pressure (MSP) from baseline levels, in response to incorrect selections (Mean = 6.57, SD = 2.60) was significantly greater than the change in MSP (Mean = -1.08, SD = 1.69) in response to unselected correct options ($t(2) = 4.984, p = .016$). XP's LM score of 9 did not differ from non-confabulating ACoA's (M = 8.1, sd = 3.8) nor did CVLT intrusions.

Conclusions: Physiological measures discriminated confabulations from accurate information indicating that autobiographical information was encoded and stored but was not accessible via aware processes. Interestingly, XP's verbal memory and intrusions did not significantly differ from non-confabulating ACoAs which highlights the need for future research to identify what regions (i.e., basal forebrain and orbitofrontal) mediate confabulation.

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B. CERBONE, D. ALLEN, J.M. LAI, Y.J. ZHANG, G.W. BRITZ & M. DULAY. Longitudinal study of prediction of return-to-work after stroke.

Objective: Stroke is a major cause of disability. Research indicates that between 20-60% of individuals remain disabled from employment in the years after a stroke depending on various factors. Return-to-work is associated with several factors according to previous research including type of job, gender, ethnicity, severity of cognitive deficits, presence of psychiatric issues, and access to cognitive rehabilitation. The purpose of this study was to examine test-retest predictors of return-to-work after stroke.

Participants and Methods: Forty-eight patients (50% women, average age of 59 years) underwent neuropsychological assessment approximately 6 months after stroke who were then retested an average of 17 months after stroke. Predictors of return to work included in analyses were biological (side of stroke), psychological (baseline depression, antidepressant use), neuropsychological (memory, executive functioning), and social (marital status, education) variables.

Results: At month 17 after stroke, 27% of individuals had returned to work, 50% had not returned to work, and 23% had never worked before or after the stroke. Chi-square analyses indicated that those who were working before the stroke who did not return-to-work were more likely to be forgetful and have executive function problems at month 6 and month 17 after the stroke (chi-square p values < 0.05). Logistic regression indicated that antidepressant use at 17 months post-stroke was a predictor of return to work (odds ratio p value < 0.05).

Conclusions: Using longitudinal data, results replicate the finding that return-to-work is hindered by residual cognitive deficits after stroke, and extends previous research by suggesting that antidepressant use may aid in managing factors that hinder return-to-work. Results highlight the importance of early neuropsychological and emotion testing to identify individuals for cognitive and emotional interventions for greater likelihood of return-to-work.

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M. DUX, L. ANTHONY, S. SIKDAR, J. YOKEMICK & B. LAL. Persistent Cognitive Dysfunction in Veterans with Asymptomatic Carotid Stenosis and Impaired Cerebrovascular Hemodynamic Function.

Objective: In the Asymptomatic Carotid Stenosis and Cognitive Function study we found that Veterans with stenosis and impaired cerebrovascular hemodynamic function (i.e., breath holding index-BHI <0.69) exhibited worse cognition compared to stenosis patients with normal BHIs. The current study aimed to build upon previous cross-sectional findings by examining cognition over a 1-year interval in the same cohort of Veterans with stenosis.

Participants and Methods: A total of 42 Veterans (22 with impaired BHI & 20 with normal BHI— M age: 68.5 years; 100% male; >75% White; M ed.: 12 years; no differences between groups) underwent comprehensive neuropsychological assessment and Transcranial Doppler (TCD) imaging at baseline and one year. Standardized scores were derived from the Calibrated Neuropsychological Normative System and were adjusted for age, sex, race, and education. Mixed model ANOVAs and pairwise comparisons were computed to assess for change over time within and between groups.

Results: No group X time effects were statistically significant. Similar to baseline findings, the impaired BHI group performed significantly worse on measures of learning (p=.002) and recall (p=.006), and a trend emerged for executive functioning (p<.1). Paired samples t-tests revealed stable to improved performance in the normal BHI group versus progression of executive dysfunction in the impaired BHI group (p<.003).

Conclusions: These longitudinal data document persistent dysfunction in aspects of cognition among stenosis patients with impaired BHIs. Results underscore the deleterious impact of hypoperfusion on cognition and suggest that impaired BHI has prognostic value in terms of

determining risk of cognitive dysfunction among patients with carotid stenosis. Follow-up studies evaluating whether surgical revascularization ameliorates cognitive dysfunction in stenosis patients with impaired cerebrovascular hemodynamics are needed and may serve to augment clinical guidelines.

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M. GOTRA, S. STERN, I. SILVERMAN, L.R. CASTILLO, J. SOBLE, W. SONG & N.H. PLISKIN. Neurocognitive Dysfunction after Revascularization in Post-Stroke Moyamoya Disease.

Objective: Moyamoya disease (MMD) is a rare cerebrovascular disease characterized by progressive occlusion of cerebral arteries and development of collateral vasculature in occluded areas. Superficial temporal artery-middle cerebral artery anastomosis is a common neurosurgical treatment for MMD, yet cognitive changes after surgery are not well characterized, especially among MMD patients with prior stroke. We sought to clarify the profile of neurocognitive impairment in post-stroke MMD patients pre- and post- revascularization surgery and examine cognitive changes.

Participants and Methods: Retrospective outpatient neuropsychological data from 10 patients (M_{age} pre-surgery=29.3 years, M_{age} post-surgery=30.7 years; $M_{interval}$ pre-surgery=2.5 months, $M_{interval}$ post-surgery=12 months) were analyzed, including: Repeatable Battery for the Assessment of Neuropsychological Status, California Verbal Learning Test/Hopkins Verbal Learning Test, Brief Visual Memory Test, Trail Making Test, Boston Naming Test/Nab Naming Test, Controlled Oral Word Association Test/Delis-Kaplan Executive Function System Verbal Fluency, Wisconsin Card Sorting Test, Stroop Color Word Test, Grooved Pegboard, and Grip Strength.

Results: Prior to surgery, patients demonstrated dysfunction (>2 SD below the mean) primarily on tests of visual memory (43%), language (60%), executive function (43%), and motor dexterity (46%), and postoperatively, on tests of verbal memory (44%), language (50%), executive function (38%), and motor dexterity (36%). Comparison of within-subject pre- and post-surgery evaluations showed significant improvement on tests of visual memory ($t(5)=2.563$, $p<.05$) and executive function ($t(6)=2.615$, $p<.05$).

Conclusions: A large proportion of patients were impaired in a broad range of domains. Comparison of pre- and post-surgery findings showed several improvements, suggesting that revascularization surgery may improve neurocognitive outcomes even in patients with prior stroke.

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R. GULHAR & D. BRAR. Case Report: Migraine or Stroke?

Objective: Migraine and stroke can present similarly. In some cases migraine can cause or occur at the same time as a stroke. A migrainous infarction is defined as a stroke due to migraine. Research has shown patients experiencing migraine with aura are at an increased risk for stroke. The pathophysiology of migrainous infarction is not clear however there are several proposed mechanisms including genetics, inflammatory factors, endothelial dysfunction, medication effect and more.

Participants and Methods: We present a case in which a 51 year old male was evaluated for sudden bilateral loss of vision, flashing lights, weakness in his left leg, and NIH stroke scale of 5 who was given tissue plasmin activator (tPA) in the Emergency Department (ED). He has a history of migraines without aura, palpitations, and hypertriglyceridemia.

On the basis of his complex presentation, full investigation and work up was done. CT and MRI surprisingly showed no evidence of hemorrhagic or ischemic damage and all other lab work was normal.

Results: Possible diagnosis included ischemic stroke, transient ischemic attack, migrainous infarction, atypical or hemiplegic migraine. Ischemic stroke and migrainous infarction were less likely due to imaging results, NIH scale score returning to 0 after 24 hours, and complete bilateral vision loss which typically indicates ischemia bilaterally. Patients symptoms were most likely due to an atypical or hemiplegic migraine which caused the headache, vision problems, and unilateral weakness. He was advised to continue current migraine medications and keep note of characteristics of future migraines.

Conclusions: Atypical migraine is a rare clinical presentation that can present as an migrainous infarction or stroke in patients complaining of headaches and vision loss. Our case highlights the importance of thorough evaluation in order to correctly recognize, diagnose and treat migrainous infarction, atypical migraine, versus stroke.

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I. HUENGES WAJER, M.E. HENDRIKS, J. HENDRIKSE, G.J.E. RINKEL, J.M.A. VISSER-MEILY, M. VAN ZANDVOORT, M.D.I. VERGOUWEN & J.B. DE VIS. The Relationship Between Cerebral Ischemia and Cognitive Outcome after Aneurysmal Subarachnoid Hemorrhage.

Objective: Many survivors of an aneurysmal subarachnoid hemorrhage (aSAH) have cognitive complaints and impairments, which hamper everyday life. Cerebral ischemia is thought to be an important determinant, but the exact relationship between cerebral ischemia and cognitive outcome is unclear. We studied the relationship between ischemic lesions on magnetic resonance imaging (MRI) during clinical course and cognitive complaints and cognitive functioning 3 months after aSAH.

Participants and Methods: We included 74 consecutive patients admitted to the University Medical Center Utrecht who had, as part of clinical routine, MRI post-coiling and neuropsychological examination (NPE) at 3 months. T2-FLAIR and DWI images were used to detect the presence, number and volume of ischemic lesions. Cognitive outcome was measured both as cognitive complaints using the checklist for cognitive and emotional consequences following stroke (CLCE-24) and as cognitive functioning using a comprehensive NPE. The relationship between cerebral ischemia and cognitive outcome was analyzed by logistic regression analyses.

Results: A high level of cognitive complaints appeared not to be related to any of the ischemic parameters. In the group with cerebral ischemia twenty-two patients (55%) showed poor cognitive functioning compared to 9 patients (26%) in the group without cerebral ischemia (OR 3.4, 95% CI 1.3-9.1). Further analyses showed that the number and volume of the ischemic lesions were not related to cognitive functioning.

Conclusions: Cerebral ischemia detected on MRI during clinical course after aSAH is a marker for poor cognitive functioning 3 months after aSAH, irrespective of the number or volume of the ischemic lesions. For cognitive complaints no such relationship is found. If ischemic lesions after aSAH are present during clinical course, referral for a NPE and cognitive rehabilitation should be considered.

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E. LERITZ, B. RASHID, T. WOOTEN, T. FERLAND, W. MILBERG, R. MCGLINCHEY & D. SALAT. Multimodal Default Mode Network Disruption in Metabolic Syndrome is Associated with Reduced Verbal Memory.

Objective: Metabolic syndrome (MetS), the clustering of three or more vascular risk factors, is associated with vascular-related cognitive impairment and dementia, especially when diagnosed in midlife. Our lab has established MetS is associated with reduced resting-state connectivity in the default mode network (DMN), and with reduced integrity in underlying white matter (WM). The purpose of this study was to examine the relative contribution of these brain changes to neuropsychological function.

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Participants and Methods: Fifty-six middle-to-older aged adults (Mean age 64; 30 with MetS) underwent a neuroimaging protocol including diffusion tensor imaging (DTI) of WM and resting-state fMRI (rfMRI). All participants were administered a comprehensive neuropsychological battery; scores were submitted to a factor analysisto reduce total variables. Regions of interest (ROIS) were extracted from significant DTI and rfMRI analyses, and multiple regression analyses were conducted to determine the relative contribution of WM integrity, rfMRI, and vascular risk to cognitive performance (memory and executive function).
Results: The MetS group performed worse on all neuropsychological factors (executive function, verbal memory, visual memory). Multiple regression analyses revealed lower FA and reduced connectivity in posterior brain ROIs in the DMN, as well as MetS status, were most predictive of item-specific verbal memory ($F=6.819$, $p< .01$). No significant predictors emerged for the domains of executive function, contextualized memory and visual memory.
Conclusions: While MetS is associated with loss to brain and cognitive integrity, our results reveal that item-specific verbal memory, which requires organization and strategy, is most affected by reduced functional and structural connectivity in comorbid vascular risk. Importantly, these findings are specific to the DMN, which is vital for cognition. Future studies will examine the clinical implications of these findings, including determining the impact on everyday functional abilities.
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M.J. MOORE, K. VANCLEEF, J. RIDDOCH, C. GILLEBERT & N. DEMEYERE. Object-Centred Neglect Associated with Worse Long Term Outcomes than Egocentric Neglect.
Objective: Visuospatial Neglect is a heterogenous neuropsychological syndrome in which patients exhibit lateralised attentional deficits after unilateral stroke. Visuospatial Neglect has been strongly associated with poor functional recovery outcome. This investigation aims to determine whether this relationship holds true for both egocentric and allocentric (object-centred) neglect to the same extent.
Participants and Methods: A consecutive sample of 391 stroke survivors completed a cancellation task in the acute phase (< 3 weeks post stroke), then were re-tested six months later. Additionally, Barthel Index and Overall Quality of Life Questionnaire data were collected.
Results: In this investigation, 43% of acute patients presented with visuospatial neglect and 61% of these cases recovered before follow up assessment. However, patients exhibiting co-occurring egocentric and allocentric neglect were found to be significantly less likely to recover than patients who exhibited egocentric or allocentric neglect alone (46% versus 70% recovered). Importantly, the presence of allocentric neglect in the acute stage was associated with lower long term quality of life and Barthel scores. Specifically, allocentric neglect (n = 28) as well as egocentric and allocentric neglect which co-occurred (n=46) were associated with reduced quality of life compared to egocentric alone (n=96).
Conclusions: These findings strongly suggests that egocentric and allocentric neglect are differentially associated with long-term neglect recovery, functional recovery, and quality of life outcomes. Specifically, allocentric neglect was found to be associated with worse long term outcomes than egocentric neglect, suggesting that clinically differentiating between egocentric and allocentric neglect may facilitate more accurate long term prognoses for stroke survivors.
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J. PERAZA. Comprehensive Neuropsychological Assessment of Comorbid Superficial Siderosis and Seizures: A Case Report.
Objective: Superficial siderosis (SS) is a rare disorder of the central nervous system involving slow or recurrent hemorrhage in the subarachnoid space. Common clinical signs include sensorineural hearing loss and ataxia. Seizures have been reported, but rarely. Previously, SS was diagnosed post-mortem, but advances in neuroimaging have led to increasing identification of SS in the living. Limited research shows cognitive impairment for memory, processing speed, verbal fluency, and executive functions. There is only one case report of a comprehensive neuropsychological evaluation, but performance validity measures were failed due to dementia. No study has examined comprehensive neuropsychological function of SS with comorbid seizure disorder prior to dementia.
Participants and Methods: A 48-year-old, White man with history of partial seizures and recent diagnosis of SS underwent a neuropsychological evaluation. A case report was conducted following the CAse REport (CARE) guidelines (Gagnier et al., 2014).
Results: Consistent with premorbid estimates, the patient demonstrated average and above performance for most cognitive domains. Processing speed was mildly-moderately impaired and impacted by ataxia. Learning and memory was largely intact, but retention for a verbal narrative was low average and mildly impaired for visual designs, which may reflect a decline. Motor and sensory testing showed either no lateralization or R > L weakness consistent with ataxia.
Conclusions: Identification of SS in living patients is increasing. Understanding neuropsychological function of SS prior to dementia is important for early intervention and tracking cognitive function over time. These results suggest cognitive function may be largely intact initially, with early decline in processing speed and memory, even with a comorbid neurological disorder (i.e., seizures). Repeat evaluation was recommended to track neuropsychological change.
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L.A. SCHAEFER & B. FAHEEM. Discharge Destination in a Geriatric Stroke Rehabilitation Population: Role of Cognitive, Functional, and Social Factors.
Objective: This is an extension of a previous study, in which the Montreal Cognitive Assessment (MoCA) was found to be related to functional outcome in geriatric stroke rehabilitation inpatients. In this study, we examined pre-stroke social factors, and focused on discharge destination by comparing groups (discharged home versus facility) on cognitive status, functional outcome, and other variables. We predicted that patients discharged home would have higher cognitive scores, better functional gain, and more social support at home, compared to those discharged to a facility.
Participants and Methods: A retrospective analysis of acute rehabilitation inpatients aged 70+ (N=92; mean age=83 years; 44 male, 48 female) with primary diagnosis of stroke (90% ischemic; 10% hemorrhagic) referred for cognitive assessment was conducted. All patients were administered the MoCA (range 2-28; mean=15) and FIM. All lived home prior to their stroke; 73% lived with someone. Half (53%) were discharged home and 47% to other facilities. Discharge destination was dichotomized and independent samples t-test performed for continuous variables: MoCA, absolute motor functional gain (mAFG), age, and length of stay (LOS). Chi-square test was performed on categorical variables: gender, pre-stroke supervision, and stroke type. Relationships between variables were determined using Spearman rank-order correlations.
Results: There were significant differences between groups on MoCA scores ($t(90)=2.476$, $p<.05$) and mAFG ($t(90)=5.622$, $p=<.001$), but not age, LOS, gender, stroke type, or pre-stroke living status. Correlations were significant between discharge destination and MoCA ($r=-.262$;$p<.05$) and mAFG ($r=-.546$;$p<.001$), but not LOS or age.

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There was a trend toward significance between MoCA scores and mAFG (*r*=.192:p=.067).
Conclusions: Older stroke patients discharged home scored higher on cognition and functional gain than those discharged to a facility. Surprisingly, pre-stroke social factors did not differ between groups (contrary to Dutrieux et al, 2016).
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I. SILVERMAN, S. STERN, M. GOTRA, L.R. CASTILLO, J. SOBLE, W. SONG & N.H. PLISKIN. Neurocognitive Profile of a Clinical Sample of Adults with Moyamoya Disease.
Objective: Moyamoya disease (MMD) is a rare congenital cerebrovascular condition characterized by occlusion of large cerebral arteries resulting in small collateral vessel formation and poor cerebral blood flow. Those with MMD suffer diffuse hypoperfusion and stroke, resulting in cognitive deficits. Although cognition in MMD has not been thoroughly investigated, existing studies revealed deficits primarily associated with subcortical damage. This study sought to better characterize the neurocognitive profile of patients with MMD.
Participants and Methods: Retrospective data from 18 patients with MMD (M_{age}=34.4, *SD*=15.0; 61% female; 88.9% history of clinical stroke; 50% history of cerebrovascular surgery) who underwent outpatient neuropsychological evaluation were analyzed. All 18 patients completed the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), and a subset of 12 also completed the Trail Making (TMT), Wisconsin Card Sorting (WCST), and Grooved Pegboard (GPT) Tests. Impaired performance was defined by z-scores of ≥1.5 standard deviations below the normative means.
Results: 47.1% of patients had impaired RBANS total scores, with the highest rates of impairment in the visuospatial (44.4%) and attention (38.9%) domains. Lower impairment rates were seen for immediate learning (27.8%), language (27.8%), and delayed memory (27.8%). High rates of impairment were also found on TMT-B (41.7%) and GPT (41.7% dominant hand, 41.7% nondominant hand), while relatively lower impairment rates were found on TMT-A (25%) and WCST (25% [errors], 16.7% [perseverative responses], and 16.7% [perseverative errors]).
Conclusions: Almost 50% of Moyamoya patients displayed impaired overall performance on a measure of global cognitive functioning (RBANS). Consistent with previous research, specific impairments were seen in attention/processing speed, although executive functioning was variable. Visuospatial ability and motor dexterity were also commonly impaired.
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J.T. TWAITE, C. POSADA, K. SLYNE, K. MORGAN, S. JONES, A. TETI, R. RANGAMANNAR & C. VARGA. Addenbrooke's Cognitive Examination – Revised (ACE-R): Performance in an Inpatient Acute Stroke Population.
Objective: Cognitive impairment occurs in 12-56% of individuals post-stroke. Neuropsychological assessment post-stroke is a recommended standard of care and, in the acute phase, informs initial rehabilitation needs. Few brief cognitive measures have been well-validated in an acute stroke population. Commonly used measures such as the Mini-Mental State Exam (MMSE) or Montreal Cognitive Assessment (MoCA) may not be sensitive enough to identify subtle impairments in specific cognitive domains. As such, post-stroke impairments may be underestimated. This study aimed to characterize the performance of a brief neuropsychological measure, Addenbrooke's Cognitive Examination – Revised (ACE-R) in an inpatient acute stroke population.
Participants and Methods: 84 hospital inpatients (56% male, *M* age = *63.6 (14.1) 33-90+*) admitted for acute stroke were administered ACE-R as part of a routine clinical inpatient neuropsychological evaluation. ACE-R total and subdomain scores (i.e., Attention, Memory, Fluency, Language, & Visuospatial) were examined in relation to key demographic (e.g., age), medical (e.g., discharge outcome), and cognitive (e.g., MMSE score) variables.
Results: Based on cut-off scores, 30% of patients were classified as impaired on ACE-R but were not impaired on the MMSE, yet all patients classified as impaired on the MMSE were also impaired on ACE-R. Trend associations were obtained between discharge disposition and ACE-R Fluency ($\chi^2 = 37.82_{(26)}$, $p = 0.06$) and Visuospatial ($\chi^2 = 33.26_{(24)}$, $p = 0.09$) domain scores. Weak correlations were found between ACE-R total score and age (r = -0.25) and education (r = 0.15). Similar findings were seen with subdomain scores. No associations were found with race or sex.
Conclusions: ACE-R is a promising measure for assessing cognitive impairment in acute stroke and may represent an advantage over existing brief measures, in part due to inclusion of domain-specific scores. Findings support further investigation into the use of ACE-R and recent update, ACE-III, in acute stroke.
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TBI (Moderate-Severe; Adult)

E. VAKIL, Y. GREENSTEIN, I. WEISS & S. SHTEIN. The Effects of Moderate-to-Severe Traumatic Brain Injury on Episodic Memory: A Meta-Analysis.
Objective: Memory impairment following Traumatic Brain Injury (TBI) is among its most pronounced effects. Meta-analysis would provide a quantitative rather than qualitative review of this data.
Participants and Methods: The present meta-analysis focused only on studies of episodic memory ($n = 63$) conducted with adult patients with moderate-to-severe TBI.
Results: The results indicate that verbal recall, whether measured by an immediate or delayed supra-span word list or a story, is most sensitive to the effects of moderate-to-severe TBI. Furthermore, verbal more than visual memory and recall more than recognition are sensitive to the effects of TBI. Several moderating factors were found: age at injury-- the younger the age, the greater the effect size of memory recall and gender; the more males, the larger the effect size. Longer time since injury was associated with smaller effect sizes in global memory measures; the higher the educational level at test, the smaller the effect sizes.
Conclusions: These findings are in accordance with the nature of TBI that affects primarily the frontal lobes. The clinical implications are that they guide the clinician to the most vulnerable aspect of memory following TBI in terms of assessment and remediation.
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Lunch (On Own)

1:15–2:15 p.m.

Paper Session 5. HIV

Moderator: Monica G. Rivera Mindt

2:15–3:45 p.m.

R. SALONER, M.J. MARQUINE, E.E. SUNDERMANN, S. HONG, J. MCCUTCHAN, R.J. ELLIS, I. GRANT & M. CHERNER. COMT Val158Met Polymorphism, Cardiometabolic Risk, and HIV-associated Neurocognitive Disorder.

Objective: The Val allele of the Val158Met single-nucleotide polymorphism of the catechol-o-methyltransferase gene (*COMT*) codes for 40% more enzymatic activity of COMT than the low activity Met allele, resulting in faster metabolism and reduced bioavailability of dopamine. Among persons living with HIV (PLWH), Val carriers display neurocognitive deficits relative to Met carriers, presumably due to exacerbation of HIV-related depletion of DA. *COMT* may also regulate cardiometabolic function, which is often dysregulated among PLWH, thus increasing risk for neurocognitive impairment (NCI). We examined whether the effect of cardiometabolic risk on NCI was moderated by *COMT* and HIV disease severity (i.e., nadir CD4) among PLWH men.

Participants and Methods: 329 PLWH men (mean age=44.0) underwent neurocognitive assessment, non-fasting blood draw, and *COMT* genotyping. Based on the study sample distributions, Z-scores for BMI, systolic blood pressure, glucose, triglycerides, and HDL cholesterol were averaged to derive a cardiometabolic risk score (CMRS). NCI was defined as demographically-adjusted global deficit score≥0.5. Logistic regression modelled NCI as a function of *COMT*, CMRS, and their interaction, covarying for estimated premorbid function, ethnicity, and HIV disease characteristics. Follow-up analysis included a 3-way interaction of *COMT*, CMRS, and nadir CD4.

Results: Genotypes were 81 Met/Met, 147 Val/Met, and 101 Val/Val. Higher CMRS increased risk of NCI among Val/Val (OR=2.13, $p<.01$), but not Val/Met (OR=0.93, $p>.05$) or Met/Met (OR=0.92, $p>.05$). Among Val/Val carriers, the effect of CMRS was moderated by nadir CD4 ($p<.01$) such that higher CMRS increased the likelihood of NCI only at nadir CD4<180.

Conclusions: Results suggest a tripartite model by which genetically-driven low DA reserve, cardiometabolic dysfunction, and historically advanced immunosuppression synergistically enhance risk of NCI, possibly due to neurotoxic inflammation and oxidative stress.

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R. SALONER, L.M. CAMPBELL, V. SERRANO, J.L. MONTOYA, E. PASIPANODYA, E.W. PAOLILLO, D. FRANKLIN JR., R.J. ELLIS, S. LETENDRE, A.C. COLLIER, D.B. CLIFFORD, B.B. GELMAN, C.M. MARRA, J. MCCUTCHAN, S. MORGELLO, N. SACKTOR, D.V. JESTE, I. GRANT, R. HEATON & D.J. MOORE. Neurocognitive SuperAging in Older Adults Living with HIV: Demographic, Neuromedical and Everyday Functioning Correlates.

Objective: Studies of neurocognitively elite older adults, termed *SuperAgers*, have identified clinical predictors and neurobiological markers of resilience against age-related neurocognitive decline. Despite rising rates of older persons living with HIV (PLWH), SuperAging (SA) in PLWH remains undefined. We aimed to establish neuropsychological criteria for SA in PLWH and examined clinically-relevant correlates of SA.

Participants and Methods: 734 PLWH between 50 and 64 years of age underwent neuropsychological and neuromedical evaluations. SA was defined as demographically-corrected (i.e., sex, race/ethnicity, education) global deficit score < 0.5 based on a normative sample of 25-year-olds. Remaining participants were classified as cognitively normal (CN) or impaired (CI) based on normative standards for actual age. Chi-square and ANOVA tests examined neurocognitive status group differences on demographics, HIV disease characteristics, medical comorbidities, and everyday functioning. Multinomial logistic regression explored independent predictors of neurocognitive status.

Results: Resulting groups were 124 (17%) SA, 279 (38%) CN, and 331 (45%) CI. Groups were comparable on demographic and HIV disease characteristics. Younger age, higher verbal IQ, absence of diabetes, fewer depressive symptoms, and lifetime cannabis use disorder increased likelihood of SA. SA reported increased independence in everyday functioning, employment, and health-related quality of life than both CN and CI.

Conclusions: Despite combined neurological risk of aging and HIV, a substantial fraction of older PLWH maintain maximal neurocognitive abilities. SA confers real-world benefits and may be better explained by cognitive reserve and maintenance of cardiometabolic and mental health than HIV disease severity. Examination of the longitudinal stability of SA, exploration of biological and genetic markers of brain integrity, and assessment of modifiable lifestyle factors should enhance interventions aimed at improving neurocognitive aging in older PLWH.

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G.G. BROWN, A. BISCHOFF GRETHE, S.J. JORDAN, S. TAPERT, R. HEATON, M. CHERNER & I. GRANT. Varieties of Reinforcement Learning Styles in HIV Infection and Methamphetamine Dependence: A Computational Modeling Study.

Objective: Most researchers using reinforcement learning (RL) to study dopaminergic function assume a homogeneous learning style among subjects. In this study, we use computational models of RL to test this assumption among individuals with/without HIV infection and with/without methamphetamine dependence.

Participants and Methods: 60 individuals performed 2 sets of an RL task intermixing reward and punishment trials as part of a fMRI study. Six RL models represented different learning styles from random learning to complex learning involving parameters for reward and punishment learning, exploration/exploitation trade-offs, and response repetition bias. Evidence ratios compared model fits.

Results: For Set 1, group was related to random vs. systematic learning, $\chi^2(3) = 8.161$, p=.045, $\varphi = .37$. 82% of random learners were HIV positive, associating HIV+ status with random learning, $\chi^2(1) = 6.89$, p=.013, $\varphi = -.34$. Among systematic learners on Set 1, models including separate reward and punishment parameters fit best. Eleven of 18 Set 1 HIV+ random learners showed evidence of learning on Set 2, contributing to a more equal distribution of random/systematic learners across the HIV positive/negative groups, $\chi^2(1) = 0.057$, p=.812, $\varphi = -.031$. Among participants with evidence of learning on Set 2, models including the repetition bias parameter best fit the sample. Of the 11 HIV+ participants who switched from Set 1 random learning to Set 2 systematic learning, 8 showed evidence of shifts to models including the bias parameter and only 2 showed the typical Set 1 learning style on Set 2. In no analysis did the inferred learning style of methamphetamine dependent individuals significantly differ from healthy controls.

Conclusions: RL style varied across participants, with the principal style changing with practice. Half of the HIV infected individuals showed evidence of delayed or impaired learning that might reflect altered dopaminergic function.

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C. WATSON, E.E. SUNDERMANN, E.E. MORGAN, R.J. ELLIS, S. LETENDRE, R. HEATON & I. GRANT. Cannabis Exposure is Associated with Less Neurocognitive Impairment in Older HIV+ and HIV- Adults.

Objective: Aging and HIV have adverse effects on the CNS, including increased inflammation and neural injury, and confer risk for neurocognitive impairment (NCI). Research suggests the non-acute neurocognitive effects of cannabis use in the general population are null or adverse. In the context of aging and HIV, cannabis use may exert beneficial effects due to its anti-inflammatory properties. We examined the separate and combined effects of HIV and cannabis use on NCI, also examining the potential modulation of these effects by age.

Participants and Methods: Participants (n=802; 18-71 years old) completed neurocognitive, neuromedical, psychiatric, and substance use assessments. Participants were excluded if they met criteria for any non-cannabis substance use disorder (SUD) in the past year. Stepwise linear regression models examined the effects of HIV and cannabis exposure (lifetime cannabis SUD and cannabis use in past year) on NCI and whether age interacted with either predictor. Post-hoc analyses investigated whether findings differed when the cannabis group was split by DSM-IV criteria for the milder abuse vs. more severe dependence category.

Results: Main effects of HIV, cannabis, and a significant interaction of age*cannabis were detected (all *ps*<.05). Across age and cannabis use groups, HIV was associated with greater NCI *(ps*<.05). Cannabis use related to less NCI among older (≥50) adults (p=.009) but not among younger adults (<50). In post-hoc analyses, only the milder abuse category was associated with less NCI among older adults.

Conclusions: Findings suggest moderate cannabis exposure may be protective against NCI in the context of aging. A possible mechanism of this result is the anti-inflammatory effect of cannabis, which may be particularly important for HIV+ individuals as they age. Further investigations are needed to refine the effects of dose, timing, and type of cannabis exposure on this relationship, which could inform guidelines for cannabis use among populations vulnerable to cognitive decline.

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L.M. CAMPBELL, C. FENNEMA-NOTESTINE, R. SALONER, M.A. HUSSAIN, A. CHEN, D. FRANKLIN JR., A. UMLAUF, R.J. ELLIS, A.C. COLLIER, C.M. MARRA, D.B. CLIFFORD, B.B. GELMAN, N. SACKTOR, S. MORGELLO, J. MCCUTCHAN, S. LETENDRE & R. HEATON. Use of neuroimaging to inform optimal neurocognitive criteria for detecting HIV-associated brain abnormalities.

Objective: Meyer et al. (2013) state that Frascati criteria for HIV-associated neurocognitive disorders (HAND) over-diagnoses mild HAND, resulting in excessive false positive errors. Meyer et al. recommend revisions to HAND criteria, as yet Meyer and Frascati methods have not been compared using independent evidence of brain abnormalities. The current study examines neuroimaging markers in those impaired via Frascati criteria but normal via Meyer criteria compared to concordantly normal and impaired HIV-infected (HIV+) participants.

Participants and Methods: 241 HIV+ adults without severe comorbidities completed neuropsychological (NP) testing assessing 7 cognitive domains, and demographically corrected NP norms were used. Participants also underwent structural MRI and MR spectroscopy. Meyer criteria defined impairment as ≤-1.5 SD in two of five domains. Frascati criteria defined impairment as <-1.0 SD in two of seven domains. Participants were classified as concordant normal (Nml/Nml), concordant impaired (Imp/Imp), or discordant (Nml/Imp) which were normal via Meyer criteria but impaired via Frascati criteria.

Results: Resulting groups were 144 (60%) Nml/Nml, 64 (27%) Nml/Imp, and 33 (14%) Imp/Imp. Groups were similar with respect to most demographics, HIV disease characteristics, and comorbidities; however, Imp/Imp had more education and a greater proportion of participants with moderate (vs minimal) comorbidities than Nml/Nml. The Nml/Imp group had less cortical gray matter (β=.08, *p*=.02), greater sulcal CSF volume (β=-.14, *p*=.04), and greater neuroinflammation (i.e., choline) in FGM (β=-.17, *p*=.01) than Nml/Nml. Nml/Imp did not differ from Imp/Imp on any imaging measures.

Conclusions: Findings indicate the discordant Nml/Imp group displays worse brain integrity and more neuroinflammation than HIV+ adults with normal cognition. Therefore, Meyer criteria appear to underclassify HAND by failing to correctly identify a large, clinically relevant group of individuals with brain abnormalities.

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Paper Session 6. Neuroimaging

Moderator: Derin Cobia

2:15–3:45 p.m.

D. SHAKED, D. LEIBEL, L. KATZEL, C. DAVATZIKOS, R. GULLAPALLI, S. SELIGER, G. ERUS, M. EVANS, A. ZONDERMAN & S.R. WALDSTEIN. Disparities in Diffuse Cortical White Matter Integrity Between Socioeconomic Groups.

Objective: There is a growing literature demonstrating a link between lower socioeconomic status (SES) and poorer neuroanatomical health, such as smaller total and regional gray and white matter volumes. Little is known, however, about the relation between SES and white matter integrity (WMI). Here we examined the relation between SES and WMI of the brain's primary cortical regions, and evaluated potential moderating influences of age and self-identified race.

Participants and Methods: Participants were 192 neurologically intact, community-dwelling African American and White adults (mean age = 52 years; 44% male, 60% White, low SES = 52%) from the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) SCAN study. Participants underwent 3.0-T cranial magnetic resonance imaging. Diffusion tensor imaging was used to compute fractional anisotropy (FA) to quantify the brain's WMI. Multiple regression analyses examined independent and interactive associations of SES, age, and race with FA of the right and left frontal, temporal, parietal, and occipital lobes.

Results: There were no significant interactions of SES, age, and race for any region. However, significant main effects for SES were found for all regions, wherein individuals with low SES had lower FA (all *p*s < .05; Bs ranged from -.15 to -.28). Except for the right temporal lobe, main effects for age were found for all regions (all *p*s < .05; Bs ranged from -.18 to -.31), wherein older age was associated with lower FA. No main effects were found for race.

Conclusions: Novel findings of this study indicate that relative to the high SES group, low SES was associated with poorer diffuse WMI. These results may reflect the higher rates of environmental and interpersonal stressors encountered by those of lower SES across the lifespan, and may help explain the preponderance of functional disparities that exist between socioeconomic groups.

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P. LAO, K. LAING, K. IGWE, Q. RAZLIGHI, J.J. MANLY, J. TERESI, C. REITZ, F. BARONE, H. MORENO, J. LUCHSINGER & A.M. BRICKMAN. The relationship between cerebrovascular and Alzheimer's neuroimaging biomarkers and cognition in middle-aged Hispanics from a cohort study in Northern Manhattan.

Objective: Midlife is a critical period for the development of cognitive impairment. We examined the association of neuroimaging-derived markers of cerebrovascular disease(CVD), Alzheimer's disease(AD), and neurodegeneration with cognitive function in middle-aged Hispanics.

Participants and Methods: 91 Hispanic participants underwent cognitive testing(mean age, range=60, 55-65;80% women;28% APOE-e4;mean education=10yrs), which was repeated 3.5yrs later with 3T MRI and Florbetaben PET. Florbetaben standard uptake value ratio, white matter hyperintensity volume(WMH), and gray matter volume(GM) and cortical thickness(CT) in key AD-related regions operationalized amyloid burden, small vessel CVD, and neurodegeneration. Verbal learning was assessed with the selective reminding test(SRT) and psychomotor speed and executive abilities with the color trails 1 and 2.

Results: Age at imaging was associated with greater WMH([0.01,0.05], p=0.01) and trend-level associated with total recall of the SRT([-0.9,0.02],p=0.06). Amyloid was higher in women([0.02,0.2],p=0.02) and in those with APOE-e4([0.02,0.2],p=0.02). Amyloid was not associated with CT or GM. WMH was trend-level associated with GM([-48,0.6],p=0.055), but not CT. Higher GM([-0.3,-0.01],p=0.04) and lower WMH([0.01,0.3],p=0.03) were associated with better performance in color trails 1. Amyloid burden and CT were not associated with cognitive function.

Conclusions: Among Hispanics, association of WMH with age and amyloid with APOE-e4 is already evident in middle-age. However, only associations between higher WMH and lower GM with lower psychomotor speed were evident in this study. Vascular cognitive impairment may become apparent in late middle age, whereas the effects of amyloid and neurodegeneration on cognitive function, particularly amnestic deficits, may occur later in the lifespan. The higher amyloid burden in women, which was independent of age and APOE-e4, is consistent with recent reports of higher AD risk in women and deserves further study.

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K. LAING, P. LAO & A.M. BRICKMAN. White Matter Hyperintensities are Associated with Increased Plasma Tau Levels in Individuals with Alzheimer's Disease.

Objective: Small vessel cerebrovascular disease(CVD), visualized as white matter hyperintensities(WMH) on T2-weighted MRI, contributes to the clinical presentation of Alzheimer's disease(AD). However, it is unclear whether CVD represent an independent pathognomonic feature or whether it is directly related to AD pathology. Recent work suggests that CVD may potentiate tau pathology in animal models, but the question has not been examined fully in human studies. The purpose of this study was to examine the association between WMH, as a marker of CVD, and plasma levels of tau, as a marker of tau pathology.

Participants and Methods: We obtained plasma tau, CSF amyloid($A\beta_{42}$), cerebral WMH and diagnostic variables for 393 participants from the Alzheimer's Disease Neuroimaging Initiative(ADNI). Participants were classified clinically as AD(n=97), mild cognitive impairment(MCI;n=187), or cognitively normal(CN;n=109), and amyloid positivity(Aβ+/-) was determined if CSF Aβ was <192 pg/mL. With a mixed design general linear model, we tested the relationship between tau plasma levels and WMH volume; additional predictors included age, diagnostic group, Aβ+/- status, and the interactions between diagnosis and tau levels and between Aβ+/- and tau.

Results: Increased plasma tau measurements were associated with higher WMH volumes(main effect of tau, F=4.2, p=0.04), particularly among patients with clinical AD(Diagnosis x tau interaction, F=5.3, p=0.005). Individuals with MCI and AD had greater WMH volumes than CN(F=3.37, p=0.035) and age was strongly associated with increased WMH volume(p<0.001).

Conclusions: The findings demonstrate a reliable relationship between WMH and tau pathology indexed in the plasma. One interpretation is that CVD induces tau pathology particularly in symptomatic stages of disease, although the possibility that tau pathology causes white matter macrostructural changes cannot be ruled out with these cross-sectional data. Future work should incorporate causal modelling and mechanistic studies related to tau and CVD.

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J.M. COLÓN, C.M. ABINADER, M. BUDGE, E. GARCON, V. GUZMAN, S. DASHNAW, N. SCHUPF, J.J. MANLY, R. MAYEUX & A.M. BRICKMAN. Incidental Findings on MRI Scans in an Older Adult Multi-Ethnic Community-Based Cohort.

Objective: Magnetic resonance imaging (MRI) is used frequently in research with older adults. Most studies quantitate features to address specific hypotheses. However, research MRI scans are typically reviewed by radiologists to detect incidental findings that may be clinically significant. Few reports have examined the prevalence of these findings in community-based participants, particularly those of diverse racial/ethnic backgrounds. The purpose of this study was to examine the prevalence of MRI incidental findings across racial/ethnic groups.

Participants and Methods: Among older community based adults, we acquired T1-, T2-, and diffusion-weighted sequences. Prior to being transferred for research analysis, scans were reviewed by a board certified radiologist, who assigned a rating of clinical severity. Level 1 indicated no clinically significant abnormalities; Level 2 indicated minor findings; Level 3 indicated abnormal findings that required clinical follow-up; and Level 4 indicated acute abnormalities. We describe the frequencies of these ratings and compare them across Whites, Blacks, and Hispanics.

Results: To date, there have been over 800 MRI scans acquired and reviewed under this standardized protocol; here we report initial results from N=231. Participants were on average 71.20 (SD=1.97) years old, and there were 35% non-Hispanic White (or other), 32% Black, and 33% Hispanics included. Incidental findings (Level 2 or 3) were found in 11% of participants, although only 1.7% had findings that required clinical follow-up (Level 3). There were no acute abnormalities observed. Severity ratings did not differ across race/ethnic groups (χ^2=6.43, p=0.169), although there was a trend for Blacks and Hispanics to have higher likelihood of incidental findings. Abnormalities observed varied and include vascular injury, potential tumor, aneurysms, and cysts.

Conclusions: Incidental MRI findings are prevalent (11%) in older adult community members, although only a small but meaningful fraction (<2%) require clinical follow-up.

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A.M. STAFFARONI, Y. COBIGO, K.B. CASALETTO, F. ELAHI, S.M. WALTERS, A. WOLF, H. ROSEN & J. KRAMER. Perfusion Imaging using Arterial Spin Labeling Predicts Future Increases in White Matter Hyperintensities and is Associated with Processing Speed Declines in Functionally-Intact Older Adults.

Objective: Cerebral blood flow (CBF) is an attractive marker given its potential for dynamic response to interventions. Few studies have assessed CBF as a predictor of future brain structure and function in older adults, especially CBF measured using MRI Arterial Spin Labeling (ASL). Moreover, no work has assessed longitudinal associations among CBF, cognition and brain structure. This study addresses these questions.

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Participants and Methods: 125 functionally-normal older adults (mean age=74) completed a computerized battery of processing speed tests and underwent longitudinal (range 1-3 visits, mean=1.9)) ASL imaging (2D-PASL, 3T). Partial volume corrected gray matter CBF was calculated. Global fractional anisotropy (FA) was used as a measure of white matter microstructure (n=122), and global WMH burden (n=109) was quantified using an automated method. Linear mixed effects models were fitted to estimate the baseline and longitudinal associations of CBF with processing speed, FA, and WMH, controlling for baseline age, gender and education.
Results: Lower baseline CBF predicted steeper increases in WMH burden (p=.013), but not declines in global FA (p=.549) or speed (p=.559). Longitudinal CBF reductions were associated with increasing WMH burden (p<.001) and FA reductions (p<.001). Greater within-person declines in CBF over time were associated with greater slowing of processing speed (p=.007). The relationship between CBF and speed remained significant after controlling for FA (p=.02).
Conclusions: We provide inital evidence that CBF may be a longitudinal biomarker of cognitive aging. Within-person reductions in global CBF are associated with declines in processing speed, even after controlling for DTI. Furthermore, baseline CBF predicts greater increases in WMH burden, and longitudinal CBF is associated with WMH and white matter microstructure. In aggregate these encouraging results indicate that CBF warrants deeper investigation as a biomarker of brain aging and potential endpoint for future clinical trials.
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L.E. OBERLIN, B.E. SNITZ, R. MACKEY, O.L. LOPEZ, L. KULLER & K.I. ERICKSON. Inflammation and Preclinical AD: Associations Between Peripheral Inflammatory Biomarkers, Cognition, and Amyloid-β Deposition in Non-Demented Older Adults.
Objective: The central role of inflammatory processes in the development of beta-amyloid (Aβ) pathology has been widely shown in rodent models, but has yet to be elucidated in humans, particularly prior to the onset of clinical symptoms. We examined associations between peripheral inflammatory mediators, cognition, and two neuroimaging Alzheimer's disease (AD) biomarkers, Aβ plaques and hippocampal atrophy, in cognitively normal (CN) elderly.
Participants and Methods: Cross-sectional data were used to assess associations between peripheral inflammatory markers, TNF-α and IL-6, and memory performance on the California Verbal Learning Test (CVLT) and Rey-Osterrieth Complex Figure Test in 139 CN older adults (mean age=85.4). Structural MRI and Pittsburgh compound B-PET imaging were used to quantify hippocampal volume and Aβ plaque deposition.
Results: After adjusting for demographics, linear regression analysis revealed that higher levels of TNF-α and IL-6 predicted poorer immediate (*TNF-*α: β=-0.20, p=0.015; *IL-6*: β=-0.16, p=0.039) and delayed memory performance (*TNF-*α: β=-0.18, p=0.031; *IL-6*: β=-0.17, p=0.035) on the CVLT. Elevated levels of inflammatory markers were also associated with higher global Aβ deposition, specifically among those that also exhibited greater hippocampal atrophy (*TNF-*α*:* β=-1.62, p=0.027; *IL-6:* β=-1.47, p=0.047). Secondary analysis using template-derived regions of interest showed that moderation effects were specific to PiB uptake in the precuneus and frontal cortex. These associations remained after adjusting for hypertension, diabetes, heart disease and white matter lesions (all p<0.05).
Conclusions: Hippocampal volume moderated the association between inflammatory markers and Aβ deposition, suggesting potential disease-state-dependent differences in peripheral inflammatory profiles during the preclinical phase of AD. These findings highlight potential protein signatures that may vary depending on the prodromal phase of disease progression, and could help identify those in specific preclinical stages.
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Paper Session 7. Sport-Related Concussion

Moderator: David Baker

2:15–3:45 p.m.

D.P. TERRY, S.M. JURICK, N.A. HUEBSCHMANN, B.A. MAXWELL, R. ZAFONTE, P.D. BERKNER & G.L. IVERSON. Sleep Insufficiency and Symptom Reporting in Youth Athletes.
Objective: Many previous studies have examined personal characteristics associated with baseline symptom reporting in athletes. However, situational factors have been studied less frequently. This study examined the influence of sleep on baseline symptom reporting in healthy student athletes.
Participants and Methods: The initial baseline database contained 29,539 individuals ages 13-18 who had not sustained a concussion in the past 6 months and completed all sections of ImPACT®, including the number of hours slept the night before. Of these, 19,529 denied having developmental/health conditions and a remote history of multiple concussions (age M=15.4, SD=1.2; 49% girls). Participants completed the Post-Concussion Symptom Scale within ImPACT®. Total hours of sleep the night before testing, gender, and concussion history were used to predict symptom burden in a multivariate regression. Athletes were also divided into four groups based on their sleep duration the night before testing (≤5, 5.5-6.5, 7-8.5, and ≥9 hours) to examine the prevalence of those athletes who reported a symptom burden resembling the ICD-10 diagnosis of postconcussional syndrome (PCS).
Results: Female gender, a remote history of 1 concussion (vs. 0), and fewer hours of sleep were each significantly associated with higher total symptom scores in a multivariate model (F=175.68, p<.001, R^2=0.04). In a second model that included an interaction term, there was a significant gender by sleep interaction [β=-.23, t(19523)=-5.09, p<.001], such that the relationship between hours of sleep and symptoms was stronger in girls compared to boys. In athletes who slept 5 or fewer hours, 50% of girls and 35% of boys met criteria for PCS, compared to 17% of girls and 11% of boys who slept 9 or more hours.
Conclusions: Poor sleep the night before testing is an important confound to consider when interpreting symptom reporting, especially for girls. It will be helpful for clinicians to take this into account when interpreting both baseline and post-injury symptom reporting.
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K. WILMOTH, T. TARKENTON, N. DIDEHBANI, L.S. HYNAN, H.C. ROSSETTI, S. MILLER, K. BELL & C.M. CULLUM. Postconcussive Anxiety, Depression, and Sleep Quality as Predictors of Prolonged Recovery in Adolescent Student Athletes.
Objective: Lingering concussion symptoms can negatively impact a child's well-being, yet variability in recovery is poorly understood. To aid clinicians in detection of those at risk for adverse outcomes, we explored the impact of post-injury psychological symptoms on recovery. Specifically, we examined early mood and sleep symptoms as predictors of prolonged symptom resolution in adolescent athletes, controlling for sex and previously established injury-related/demographic risk factors.
Participants and Methods: Student athletes (aged 12-18, N=393, 55% male) were evaluated in outpatient concussion clinics 0-2 weeks after injury and completed the General Anxiety Disorder-7 Item (GAD-7), Patient Health Questionnaire-8 Item (PHQ-8), Pittsburgh Sleep Quality Index (PSQI), and concussion symptom scales. Medical record review at 3-months provided date of symptom resolution. Survival

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analysis for time to recovery was conducted with 1) prior medical history (sex, psychiatric disorder, prior concussion) & injury-related factors (loss of consciousness, retrograde or post-traumatic amnesia, initial symptom severity score), and 2) psychological factors: GAD-7 total score, PHQ-8 total score, and PSQI global score.
Results: In the total sample, amnesia, postconcussive symptoms, and sleep quality were associated with recovery length (HRs=0.64-0.99, ps<.05). When analyzed by sex, only initial symptom severity score was associated with recovery for females (with females reporting greater symptom severity than males), and amnesia and greater PHQ-8 scores were significant predictors for males (HRs=0.54-0.98, ps<.05).
Conclusions: Our findings linked brief psychological screening and symptom severity scores to prolonged concussion recovery, after considering injury and medical factors. Assessment of mood and sleep may aid in identification of individuals at risk for worse outcomes, though further exploration of postconcussive psychological issues and potential sex differences is warranted before drawing firm conclusions.
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K.E. RIEGLER & P. ARNETT. Differences in Neuropsychological Test Performance between Depressed and Non-Depressed Collegiate Athletes Following Injury.
Objective: To examine differences in performance on a hybrid neuropsychological (NP) test battery following sport-related concussion (SRC) between athletes screening positive and negative for depression.
Participants and Methods: 113 (M=91, F=22) college athletes were assessed on a hybrid NP battery and screened for depression using the Beck-Depression Inventory-Fast Screen (BDI-FS) at baseline and post-SRC. Athletes were categorized as depressed (≥4) or non-depressed (<4). Reliable change index scores were calculated to determine significant increase or decrease from baseline performance and net detection rates identified the clinical utility of each measure. Chi-square tests of independence between depression screening status as a function of reliable increase or decrease on each test measure were evaluated.
Results: Compared with nondepressed athletes, a significantly higher proportion of athletes screening positive for depression had a reliable decrease in performance on the following test indices: ImPACT Verbal Memory, $\chi2(1, N = 106) = 4.85$, $p = .03$, $\phi = .21$; ImPACT Reaction Time, $\chi2(1, N = 106) = 4.94$, $p = .03$, $\phi = .22$; BVMT-R Total Immediate Recall (IR), $\chi2(1, N = 110) = 45.26$, $p = .02$, $\phi = .22$; HVLT-R Total Immediate Recall (IR), $\chi2(1, N = 109) = 3.77$, $p = .05$, $\phi = .19$. The six tests with highest net-detection rates (above 15%) were: ImPACT Verbal Memory (18.7%), BVMT-R Delayed Recall (15.3%), BVMT-R Total IR (19.1%), HVLT-R Delayed Recall (16.2%), HVLT-R Total IR (19.0%), and SDMT (16.4%).
Conclusions: Compared with nondepressed athletes, those screening positive for depression demonstrated reliable decline from baseline performance on a number of NP measures, notably measures of memory. Net detection rates further indicated that tests of memory are more sensitive to problems with depression following SRC than tests of processing speed. Athletes experiencing depression post-SRC may be more vulnerable to memory deficits in the acute phase of recovery.
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E. GUTY & P. ARNETT. Affective Bias and Depression in Collegiate Athletes Post-Concussion.
Objective: Research has shown that athletes at baseline who demonstrate a negative recall bias on an affective verbal memory test report more depression symptoms compared to athletes who do not demonstrate this negative bias (Ramanathan et al., 2012). However, this effect has not been explored in athletes post-concussion. This study aimed to explore the relationship between negative affective bias and depression in athletes following sports-related concussion. **Participants and Methods**: 110 college athletes were administered the Affective Word List (AWL), a validated verbal memory task which includes 16 positively and negatively-valenced words (Meyer & Arnett, 2015). To control for overall recall, a Negative Bias Ratio Index was derived by calculating the total number of negative words recalled divided by total number of words recalled. Participants were placed in a Negative Bias group (ratio scores of >.50) or No Negative Bias group (ratio scores of <= .50). Participants also self-reported depression symptoms using the BDI - Fast Screen (BDI-FS), and were split into a No Depression Symptoms group (BDI-FS = 0) or a Some Depression Symptoms group (BDI-FS > 0). **Results**: Chi-square analysis demonstrated that of the 35 individuals who demonstrated a negative bias, 26 (74%) reported depression symptoms, $\chi2 (1, N = 110) = 3.86$, $p = .05$, $\Phi = .19$. **Conclusions**: There was a significant relationship between demonstrating a negative affective bias on the AWL and reporting depression symptoms following concussion. Compared to athletes not showing a negative affective bias, we found that almost three times as many athletes demonstrating a negative affective bias reported depression symptoms. This type of affective index derived from our AWL memory test could be useful for identifying individuals who may be at greater risk for experiencing depression symptoms post-concussion, and provide a performance-based measure that validates self-reported depression.
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T. CAZE & A. MAERLENDER. Anxiety Sensitivity's Relationship to Symptom Recovery after Sports-Related Concussion.
Objective: Previous research has shown that Anxiety Sensitivity (AS), the propensity to catastrophically misinterpret internal sensations, is related to the number of symptoms reported after mTBI (Wood et al., 2011, 2014). Total scores from the most commonly used AS scale, the ASI-3, as well as the Cognitive and Physical (but not Social) subscales from this measure have also been shown to be related to symptoms reported immediately after Sports-Related Concussion (SRC) and days until cleared from cognitive testing (Caze et al., 2016). The purpose of this study is to examine how an athlete's AS is related to rate of change (slope), a decrease in concussion symptoms over time. It is hypothesized that AS will be related to the peak of symptoms after injury (H.1) and to the change/decrease in symptoms over time (H.2).
Participants and Methods: Data from 29 collegiate athletes from a University sports program, whose concussion symptoms were measured across three post-injury time points using the Concussion Symptom Inventory (CSI; Randolph et al., 2009), and who completed the Anxiety Sensitivity Index-3 (ASI-3; Taylor et al., 2007) at baseline or post injury time point 1, were analyzed using Growth Curve Analysis (GCA).
Results: Consistent with H.1, for every one unit increase in AS - Cognitive there was a 1.96 unit increase in concussion symptom scores at time 1 (p<.001). Consistent with H.2, the rate of daily change in concussion symptoms increased by .08 for each one unit increase in ASI - Cognitive scores (p<.001).
Conclusions: This study builds on previous literature that AS is related to symptom reporting after SRC. A unique contribution of this study is that AS is also related to a slower rate of decrease in concussed symptoms over time (slope) following SRC. There is potential for treatment interventions for this propensity of those high in AS to misinterpret post-concussion symptoms; follow-up studies looking at efficacy of AS treatment after SRC are needed.
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L. GREENBERG, E. GUTY, A.R. RABINOWITZ & P. ARNETT. Personality Factors in Sports Concussion.

Objective. Sports concussion is associated with a wide range of symptoms, of which headache (HA) has frequently been shown to be the most severe and commonly reported symptom (Heyer et al., 2016). Further, HA is often the sole remaining symptom and typically among the last to resolve (Greenberg & Arnett, 2018). Considering the disruptive and often debilitating nature of HA, this study aimed to examine premorbid personality traits that might predict the resolution of this important post-concussion symptom.

Participants and Methods. Participants were 57 college athletes (83% male) participating in a sports concussion management program including baseline testing, who met the following criteria: 1) sustained a concussion according to the Zurich definition; 2) the presence of post-traumatic headache (PTH) according to the International Classification of Headache Disorders, 3rd edition and; 3) no history of HA treatment by a physician prior to concussion. Baseline testing included the NEO-PI (a measure of Big-5 personality traits). Post-concussion testing included a semi-structured interview (i.e. The Post-Concussion Interview; PCI), used to determine PTH duration.

Results. At an initial post-concussion visit, 17 participants reported PTH (Unresolved) and 40 were asymptomatic (Resolved). The Resolved group exhibited significantly higher Agreeableness at baseline (M=32.5, SD=5.4) than the Unresolved group (M=29.3, SD=5.6);
$t(55) = 2.00$, $p = .05$. No significant differences were found between groups on the other Big-5 personality factors.

Conclusions. Premorbid personality characteristic, such as agreeableness, may favor better outcomes regarding the most common, severe and often debilitating post-concussion symptom, HA. Further research on personality and post-concussion symptomatology is needed to inform symptom management.

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Symposium 6. Integrating Personality, Cognition, and Brain Imaging

Chair and Presenter: Sharon Sanz Simon

Discussant: Colin DeYoung

Presenters: Melissa C. Sweeney, Angeliki Tsapanou, Silvia Chapman, Victoria M. Leavitt

2:15–3:45 p.m.

S. SANZ SIMON, M. SWEENEY, A. TSAPANOU, S. CHAPMAN, V.M. LEAVITT & C. DEYOUNG. Integrating Personality, Cognition and Brain Imaging.

Personality traits describe differences in an individual's character that have implications for emotional experiences and behavior. Personality may influence the development of cognitive abilities, contribute to individual differences in cognitive impairment in neurological populations, and modify the risk of age-related cognitive decline through, for example, response to stress, health behaviors, and engagement in social and cognitively stimulating activity. Integrating assessments of personality and neuropsychology along with neuroimaging can provide valuable information on the role of personality as a protective resource against, or a source of vulnerability to, cognitive impairment. There is growing interest in the manner in which personality may influence various neurocognitive functions, however, results have been inconsistent. The aim of the current symposium is to address the complex relation between personality, cognition, and brain functioning by examining these constructs across adulthood and in neurological populations. The first presentation (Simon & Stern) will focus on personality-cognition relations across the lifespan, and how age and gender moderate these relations. The following two presentations will address the neuroanatomic correlates of personality. Specifically, Sweeney et al. will focus on the relation between cortical thickness and neuroticism across adulthood, and Tsapanou et al. will discuss the unique association between the default brain network, neuroticism, and vocabulary in older adults. The last two presentations will address personality-cognition relations in clinical populations. Chapman et al. will describe the contribution of conscientiousness to self-awareness in stroke patients and healthy older adults; and Leavitt & Sumowski will present the relevance of neuroticism for memory performance in young adults with multiple sclerosis. Finally, Prof. DeYoung will provide an integrative overview of the results and lead a discussion.

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S. SANZ SIMON & Y. STERN. Personality-Cognition Relations across the Lifespan: the Role of Gender.

Objective: Personality and cognition has been previously linked. However, there are inconsistencies regarding whether their relationship varies as a function of age, and lack of evidence in how gender contribute to these relationships across the lifespan. In the present study, we examined the association between personality and cognition across adulthood, accounting for age and gender. **Participants and Methods:** Four-hundred and thirty clinically healthy adults between 19 and 80 years were included. Participants completed a measure of personality and several neuropsychological measures related to reasoning, vocabulary, memory and speed of processing. Hierarchical multiple regression analyses were conducted in order to investigate personality-cognition relations, and interaction effects among age, gender and personality traits on the cognitive performance. **Results:** We found three main major findings. First, both personality and cognition varied as a function of age and gender, although these changes are inconsistent across traits and cognitive abilities. Second, personality predicted several cognitive abilities. Openness was positively associated with most of the cognitive abilities, such as reasoning, vocabulary and memory scores; extraversion was negatively associated with reasoning and vocabulary; as well as neuroticism with vocabulary; and conscientiousness was negatively associated with reasoning and vocabulary, although positively associated with processing speed. Third, age and gender moderated some of the personality-cognition relationships. We found an interaction between conscientiousness, age, and gender, indicating that high conscientiousness in men predicts greater vocabulary and reasoning than in women, as age increases. **Conclusion:** Our findings demonstrate that personality-cognition relations are more complex than previously reported, since they are, in part, moderated by age and gender.

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M.C. SWEENEY, A. TSAPANOU & Y. STERN. Regional Cortical Thickness and Neuroticism Across the Lifespan.

Objective: Neuroticism is associated with greater reactivity to stress and lifetime psychopathology, thus the aim of the current work was to investigate the association between neuroticism and cortical thickness across the lifespan. **Particiants and Methods:** Four hundred and fifty subjects between 19-80 years were included. We examined the association between neuroticism and regional and total cortical thickness (CT) across the lifespan, accounting for gender. We also assessed interactions among these factors. Participants completed the International Personality Item Pool and a structural MRI scan. Total CT and the mean values of CT in five regions of interest were examined. We also investigated the interaction effect among age, gender and neuroticism on CT. **Results:** There was no significant association between neuroticism and regional/total CT. A significant interaction between neuroticism,

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age, and gender on the thickness of the anterior cingulate was found. Women high in neuroticism showed a thinner anterior cingulate cortex than women low in neuroticism, with increasing age. In contrast, men high in neuroticism had a thicker anterior cingulate cortex compared to men low in neuroticism, with increasing age.
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A. TSAPANOU, C. HABECK, S. SANZ SIMON & Y. STERN. Default-mode Network and Neuroticism in Older Adults. Prediction of cognition.
Introduction: The association between Default Mode Network (DMN) and personality could be of a high interest, providing information about the underlying connections between different personality dimensions and specific patterns of brain activation at rest. **Participants and Methods:** Cross-sectional design in 217 cognitively healthy older adults with 16.4 mean years of education. Participants underwent a functional MRI, from which 4 reference abilities were derived: memory, speed of processing, vocabulary, and reasoning. DMN intra-network connectivity was computed as the mean pairwise connectivity in all possible pairs located within the DN. Participants also completed the International Personality Item Pool questionnaire. Five personality traits (transformed in z-scores) were derived: extraversion, agreeableness, conscientiousness, neuroticism, and openness. Linear regression model was performed with DMN as the dependent variable and the 5 personality categories simultaneously as the predictors. Generalized Linear Models also used for the interaction effect between DMN and neuroticism on cognition. Age and Intracranial volume were added as covariates. **Results:** DMN was significantly associated with neuroticism (p=0.036). After adjusting for the covariates, the association remained significant (p=0.047). There was also a significant interaction effect between DMN and neuroticism on vocabulary (p=0.018). Adding the covariates to the model, association remained significant (p=0.026). **Conclusion:** More active brain network was significantly associated with low neuroticism in cognitively healthy older adults. Furthermore, good language performance could be predicted by the association between DMN and neuroticism. Examining such relations in a framework eliminating neurological and psychiatric factors could provide us with more direct information about the association between brain networking and personality.
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S. CHAPMAN, J.L. JOYCE, G. COCCHINI, L.E. COLVIN, D.C. MOGRABI, M. MEINERDING, B.R. IDNAY, M.S.V. ELKIND, E.D. HUEY & S. COSENTINO. The Effects of Personality on Self-awareness.
Objective: Self-awareness of cognitive function due to brain injury or degeneration is a key component of the neuropsychological examination both at diagnosis (e.g., subjective cognitive decline as a marker of preclinical dementia) and at rehabilitation (e.g., for the successful application of rehabilitative or compensatory strategies). Although metacognitive abilities may play an important role in supporting self-awareness, other factors, such as premorbid personality traits, can affect how self-evaluative processes operate. Here we address how personality traits contribute to self-evaluation in a brain-injured population and sample of ageing adults. **Participants and Methods:** Self-awareness of cognitive functioning (i.e., discrepancy scores between self- versus informant-report, and self-report versus objective cognitive functioning) and the big five personality traits were examined among both stroke patients (n=30), 60 % male, 69 years old (SD = 12.3) and 14.4 years of education (SD=4.3), and healthy ageing adults (n=65), 72% female, 71.7 years old (SD=7.2) and 16.1 years of education (SD=2.1). Partial correlations were used in each group to examine the independent variance of each personality trait adjusting for other personality traits and demographic factors. **Results:** The personality trait of conscientiousness was found to be associated with self-awareness of cognition such that higher levels of conscientiousness were associated ($p<.05$), with more accurate and underconfident self-evaluations of cognition in both stroke patients and healthy ageing adults. **Conclusions:** Conscientiousness appears to contribute to the accuracy of individuals' self-evaluation in both healthy and clinical populations. The consistency of these results suggests that personality factors, and level of conscientiousness in particular, should be taken into consideration when assessing the integrity of self-awareness and understanding manifestations of disordered awareness.
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V.M. LEAVITT & J. SUMOWSKI. Neuroticism is Related to Nonverbal Memory Function in Persons with Multiple Sclerosis.
Objective: Cognitive impairment affects approximately half of persons with multiple sclerosis (PwMS), even early in the disease course and in the absence of physical disability, yet our ability to predict cognitive decline is limited. Identifying treatable/modifiable risk factors for cognitive decline is a research priority. Personality traits represent a stable, easily measured variable that may provide valuable predictive information for cognitive outcomes. **Participants and Methods**: Cognitive measures and NEO-Five Factor Inventory were completed by 183 PwMS (RESERVE Early MS cohort) within 5 years of diagnosis (121 female; age 34.4± 7.5 yrs; education: 67.8% ≥ 16 yrs; disease duration: 2.2±1.5 yrs; EDSS: median 1.5, interquartile range 1.5; IQ: 108.3± 8.8). Latent variables derived with PCA yielded 4 variables: nonverbal memory, language processing, verbal memory, attention/processing speed. Partial correlations controlling for age, sex, education, and IQ tested relationships of 5 personality traits to cognition. Regression modeling was conducted to test unique variance contributed by personality traits, over-and-above demographics, to cognition. **Results:** Neuroticism was the only personality factor linked to cognition: nonverbal memory (r_p= -.211, p= .005) and attention/processing speed (r_p= -.154, p= .040). Regression modeling revealed only nonverbal memory to be predicted by neuroticism [F change (1,179)= 7.999; $R^2\Delta$= .036, p=.005). **Conclusions:** Work in MS to date has shown links between neuroticism and openness to memory (Leavitt et al, 2017). The results of the present analysis augment prior findings revealing a link between neuroticism and memory, a relationship that is evident even early in disease course. Neuroticism, a trait describing an individual's tendency towards maladaptive stress response, may represent an important treatment target / risk factor to consider in future memory interventions in MS.
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Symposium 7. MABEL – Multi-language Assessment Battery of Early Literacy: Approaches to Literacy Testing Across Languages

Chair and Presenter: Markéta Caravolas

Presenters: Markéta Caravolas, Marina Mikulajova, Silvia Defior

2:15–3:45 p.m.

M. CARAVOLAS, M. MIKULAJOVA, S. DEFIOR, G. SEIDLOVA MALKOVA & M. CARAVOLAS. MABEL – Multi-language Assessment Battery of Early Literacy: Approaches to Literacy Testing Across Languages.
We propose a symposium to present MABEL (Multi-Language Assessment Battery of Early Literacy), a web-based tool for the assessment of children's early literacy and related skills across several European

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languages. The battery is designed to be used in research and psycho-educational practice. MABEL comprises measures, directly comparable across languages, and targets foundational literacy skills such as phoneme awareness, letter knowledge, and rapid naming, as well as a variety of reading and spelling measures. It was developed as part of the ELDEL research programme (a Framework 7, Marie Curie ITN) focusing on cross-linguistic studies of literacy development in multiple languages, including English, Spanish, French, Czech, Slovak (Caravolas et al 2012, Caravolas et al 2013).

The MABEL tests enable a systematic screening assessment for identifying children at risk of literacy difficulties, who speak any one, or a combination, of the languages currently within the battery. For this reason it is valuable in various bilingual, multilingual educational and clinical contexts, especially at the onset of literacy instruction. For research purposes, MABEL offers a set of directly comparable measures that can be implemented in cross-linguistic or single-language studies of reading and spelling development.

Each symposium presentation will highlight a specific test bundle (e.g., tests of phoneme awareness, rapid naming, reading, spelling) in the context of its origins in the ELDEL research programme. Moreover, a demonstration will be made of the relevant tests on the MABEL website, including the procedures for downloading and using the materials for standard paper-and-pencil administration, and/or for computer-assisted administration. The Discussion will focus on the benefits and limitations of directly comparable measurement tools, and will consider further approaches for ameliorating assessments of children's early literacy and related skills in different languages.

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G. SEIDLOVA MALKOVA. Reading Tasks in MABEL.

This paper presents the reading tasks included in the MABEL test suite, which were designed to enable direct cross-linguistic comparisons of early reading skills among children learning alphabetic orthographies. MABEL aims to provide comprehensive reading profiles of young readers, and thus contains both aloud and silent reading tasks. The tests of reading aloud assess reading efficiency of words (One Minute Word Reading Test) and pseudowords (One Minute Nonword Reading Test), which respectively measure accurate reading under time pressure. Silent reading efficiency is assessed using the Picture-Word Matching Test, which requires the selection of a target word, from four printed alternatives, that corresponds to a picture stimulus. Each of these tests was constructed using the same criteria across languages for stimulus selection, structure, and administration procedures. MABEL offers two formats of each of the above tests: a downloadable paper and pencil format, and a computer assisted version. The paper will briefly introduce the test content, procedures and possible applications of the available language versions, in both formats.

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M. MIKULAJOVA. Phoneme Awareness Tasks in MABEL.

Phonological awareness (PA) skills play a crucial role in early literacy acquisition across alphabetic orthographies. PA tasks currently included in MABEL represent cognitive instruments in English, Spanish, Czech and Slovak languages. While PA skills have been for decades deeply rooted in pre-literacy and literacy research and practice in English, and to some extent also in Spanish-speaking communities, and therefore have given rise to a variety of diagnostic tools, the opposite is true for the Czech and Slovak countries. MABEL includes three measures of PA: two that assess analytic phoneme manipulation skills – namely Phoneme Isolation and Phoneme Deletion –, and one that assesses synthetic phonemic skills – namely Phoneme Blending. MABEL offers two formats of each of the above tests: a downloadable paper and pencil format, and a computer assisted version. In this presentation we explain the principles of test creation across languages, and demonstrate components of the computer-assisted versions, such as the administration instructions, training phase, and test items. Psychometric properties of the measures will be conveyed and proposals for adaptation into additional languages will be made. We will conclude with the benefits that come from the web-based open access display of these tests for research and practice.

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S. DEFIOR. RAN and Letter Knowledge Tasks in MABEL.

Along with phoneme awareness, measures of letter knowledge (LK) and rapid automatized naming (RAN) are well established early predictors and correlates of children's reading and spelling abilities. Moreover, they seem to hold the status of cognitive universals predictors for learners of alphabetic orthographies. Accordingly, the MABEL test suite includes tests of LK, assessing knowledge of letter sounds and names, in upper and lower case, as well as four measures of RAN, which assess rapid naming respectively of colours, objects, digits and letters. This presentation will highlight the factors that were taken into account in the creation of parallel test forms across five languages, including constraints on administration and scoring. Reference will be made to the research publications confirming the validity of the measures. We will demonstrate the standard paper versions of the tests, as well as the features and functioning of their web-based analogues. Considerations for interpreting individual test results, and for adapting the LK and RAN measures to additional languages will also be presented.

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M. CARAVOLAS. The MABEL Battery -Discussion of the Benefits and Limitations of Directly Comparable Measures of Literacy.

The MABEL tool arises from a body of cross-linguistic research into the universals and language-specifics of literacy development within the European ELDEL network. This symposium highlighted how measures constructed to assess literacy and related skills in directly comparable ways across a number of languages with alphabetic orthographies can be designed to yield good psychometric properties with good cross-language validity. As such, they offer excellent tools for cross-linguistic research investigations and for clinical and educational practice within single language communities or those serving children speaking/reading in any combination of MABEL's current languages. However, across the presentations, some limitations will have also come to the fore, regarding the potential for violations of ecological-linguistic validity of the measures, the need for background tools (such as lexical corpora) for the accurate selection of comparable items, and the possibility of excluding important language-specific measures. These issues will be discussed with a view to opening the way for extending MABEL to other languages, while also maintaining good reliability, validity and practical usefulness of the measures for any given language.

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M. CARAVOLAS. MABEL – Multi-language Assessment Battery of Early Literacy – Introduction and Background.

Cross-linguistic studies play an important role in research on literacy development and its cognitive underpinnings. We will present the Multi-language Assessment Battery of Early Literacy (MABEL), a freely available, web-based suite of tests, constructed for direct cross-linguistic comparisons of children's foundation-level skills. These include phoneme awareness, letter knowledge, rapid naming (RAN), as well as measures of reading and spelling. The tests contained in MABEL were created and validated in the ELDEL research programme, which investigated, longitudinally, the language-specific and general aspects of early literacy development across five languages with alphabetic orthographies. General issues relating to the development of the MABEL measures will be considered. These include how to determine

the key design parameters for directly comparable cross-linguistic tests of phonological processing, reading and spelling; how to delimit the language-general and language-specific components of each skill for statistical and clinical analysis; and how to control for (or manipulate) important variables pertaining to the linguistic/orthographic, cognitive-developmental, and educational context of the studied groups. A brief overview of the MABEL website and its key features will be made.
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Poster Session 5. Pediatric Medical & Neurodevelopmental

2:30–3:45 p.m.

ADHD/Attentional Functions

K.R. ALLEN. Expressive Intelligence as an Indicator of IQ: Correlation and Prediction of EOWPVT-4 Scores and WISC-V FSIQ Scores of Children Diagnosed with Attention Deficit Hyperactivity Disorder.

Objective: With the growing diagnoses of ADHD in children, the effects of more arduous testing may have an impact on the validity of those time-consuming intelligence tests. The Expressive One-Word Picture Vocabulary Test (EOWPVT) had previously been considered a good measure of estimated overall intelligence. Utilizing this test's brevity for children with ADHD may be beneficial in estimating where the fifth edition of the Wechsler Intelligence Scale for Children's (WISC-V) full-scale intelligence quotient (FSIQ) scores can be expected to exist. The fourth edition of the EOWPVT and the WISC-V have yet to be studied in relation to correlating scores of expressive language abilities and FSIQ.
Participants and Methods: Archival data from children aged 8-15 years old who were evaluated for and diagnosed with ADHD at a practice between 2015 and 2017 were analyzed in this study. The data set was anonymized by a student assistant who was at the site. The de-identified data was collected from a computer on-site at the practice. The assistant was to go through each testing case that had only an ADHD diagnosis and report the requested information into a password protected Microsoft Excel file. The data were password protected and stored on an encrypted drive.
Results: Statistical correlation coefficient analysis used the EOWPVT-4 scores and WISC-V FSIQ scores as variables. Linear regression analysis was performed to determine significance of the EOWPVT-4 score predicting a WISC-V FSIQ score. The WISC-V FSIQ scores were significantly related to the EOWPVT-4 scores, $r(91)=.569$ ($p<.001$). Through regression analysis, it was found that EOWPVT-4 scores alone accounted for 31.6% of the variance in a score on the WISC-V.
Conclusions: The EOWPVT-4 may serve as a good estimator of intelligence for children with ADHD through a less intensive evaluation process. An estimate of FSIQ for these children could help to inform expectations for FSIQ from the WISC-V or serve as a comparison score when concerns over validity are present.
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J.C. SHEEHAN, S. MACOUN, B. BEDIR, D. HALLIDAY, S. ALI, G. SEMAIL & A.Y. KIM. Discriminant Validity and Clinical Utility of the Comprehensive Executive Function Inventory (CEFI) in the Assessment of Childhood ADHD.

Objective: Although Attention-Deficit Hyperactivity Disorder (ADHD) was traditionally regarded as being primarily a disorder of inattention and/or hyperactivity-impulsivity, the central role of Executive Function (EF) in the emergence and presentation of the disorder is now well established in the literature. Performance-based clinical measures of both EF and attention show questionable ecological validity for ADHD diagnostics; however, informant-report rating scales have more consistently demonstrated their clinical utility for capturing important aspects of the disorder, including those related to EF. The purpose of this study was to examine the discriminant validity and clinical utility of the recently developed Comprehensive Executive Function Inventory (CEFI; Naglieri & Goldstein, 2013) for the assessment and diagnosis of childhood ADHD in a Canadian sample.
Participants and Methods: Participants included TD children (n=50) and those with a pre-existing diagnosis of ADHD (n=27) ages 6-13 years, screened for other disorders and matched on age/IQ. ADHD diagnosis was confirmed with the KSADS. Parent/teacher ADHD rating scales (DuPaul 5), parent CEFI, and several attention and EF performance measures were administered.
Results: DuPaul-5 and parent-report CEFI, in addition to several performance measures, were assessed via stepwise discriminant analysis. The DuPaul-5 (92.2%) and several scales within the CEFI, including the full scale (89.6%), performed similarly in correctly identifying group membership. Attention and EF performance measures were not found to add significant discriminant value.
Conclusions: The CEFI parent-report appears to hold significant discriminant validity and clinical value for the assessment and diagnosis of ADHD in child populations. As expected, performance measures did not provide significant value in identifying children with confirmed ADHD. Separate CEFI subscale performances, as well as implications for diagnosis among ADHD vs. ADHD/ODD groups, will be discussed.
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A. SALMAN, C. COSTIN, A. MCKINSTRY & F.W. BYLSMA. With the CPT3 for ADHD Does the CATA Matter?

Objective: Examine the concordance of attention variable (Inattention, Impulsivity, Sustained Attention) performance classifications (No, Some, Strong Indication) across the visual CPT3 and auditory CATA, tests often used to assess attention deficit hyperactivity disorder (ADHD). Are they both needed?
Participants and Methods: Participants are 64 patients (38 M, 26 F) aged 7-53 ($M = 20.4 \pm 9.9$ yrs) with 2-21 years of education ($M = 11.1 \pm 5.1$ yrs) treated with ADHD medication and referred for assessment to confirm prior ADHD diagnosis. Each was administered the CPT3 and CATA with and without ADHD medication taken. The performance classification variables were contrasted (Chi-square) across the 2 tests to determine if there is concordance in attention performance deficit severity with and/or without medication on board.
Results: There was minimal concordance for Inattentiveness across the 2 tests, regardless of whether medication was taken prior to testing. Off medication, 11 of 19 cases with Strong Indication of inattention on the CPT3 were rated that way on the CATA, 5 of 20 for Some Indication, with 18 of 23 showing No Indication ($p < .001$) on both tests. On medication, 4 of 12, 7 of 17, and 27 of 34 were concodant ($p < .001$), respectively, for severity of Inattentivness. Concordance was better for Impulsivity (but still signifiantly different across tests), and best for Sustained Attention, with no significant difference noted across tests -- off and on medication.
Conclusions: CPT3 and CATA measure Inattentiveness differently, but Sustained Attention more consistently. A likely contributor to the discrepancy is test charactristics. The CPT is a Go-No GO task with variable interstimulus interval (ISI) and unpredictable target presentation. The CATA is a Go-No Go task with consistent ISI and a warning stimulus (WS) indicating a target will appear next -- a "pay attention now" cue. The CATA format may promote attentiveness, and be a less sensitive test of inattention.

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A. CHAUDHARI. Neurostimulation for ADHD: Insights from the Past 10 Years.

Objective: Provide an overview of neurostimulation in the treatment of ADHD, discuss recent therapeutic advances, and make the case for further investigation and clinical use.

Participants and Methods: MEDLINE terms "ADHD", "attention deficit hyperactivity disorder", "attention deficit disorder" were combined with "TMS", "tDCS", "deep brain stimulation", "neurostimulation", and "neuromodulation". Of the 209 abstracts reviewed, 26 publications were chosen based on relevance, original data and focus on treatment-geared modalities.

Results: Over the past 10 years, a total of 555 patients with ADHD (429 M, 126 F, ages 5 to 59) received neurostimulation via TMS, rTMS, cTBS, tDCS, toDCS, Anodal tDCS, TNS, GPi-DBS, and/or neurofeedback training. All interventions were safe, minimal risk, and suitable for both children and adults. Results from these interventions were compared in individual studies to pre-treatment stimulation levels (n=12, total 164 patients), to other treatment-naïve ADHD patients (n=4, total 57 patients) or to healthy controls (n=11, total 291 volunteers). TMS-evoked measurements of motor cortex disinhibition, cortical-subcortical interactions (TGC), and intra-cortical inhibition (N100, SICI, ISPL, ISI) correlated well with clinical ratings and motor control deficits. Therapeutic benefits were seen both on neuropsychological tests (attention, concentration, stimuli detection, sleep memory) and social performance (delinquent behavior, physical aggression). In addition, 43 patients with ADHD and comorbid Tourrette's syndrome experienced decreases in tic frequency after TMS for up to 6 months.

Conclusions: Our analysis shows that neurostimulation techniques have a clear potential utility both as methods for pathophysiological investigation and as adjuvant therapies for ADHD. Future large-scale randomized double-blind clinical trials would expedite FDA approval of evidence-based techniques and their commercial availability.

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A. SALMAN, A. MCKINSTRY, C. COSTIN, J. CUDIA & F.W. BYLSMA. ADHD: Yes, No, Maybe So.

Objective: Determine attention test (CPT-3) and self-report symptom questionnaire (CAARS-S:L, BRIEF-A Self, PAI) differences between adults with equivocal ADHD diagnosis and those who do and who do not meet DSM-V ADHD diagnostic criteria.

Participants and Methods: 97 adults (age 17-65; 48.5% M) were assessed for possible ADHD, and gave informed consent to participate in research conducted at a private neuropsychological assessment practice. Neuropsychological assessment was completed and 40 were not diagnosed with ADHD (ADHD-No), 34 were diagnosed (ADHD-Yes), and 23 had equivocal / Rule-Out diagnosis (ADHD-Maybe). Objective attention test performance and self-rated symptom-report data was compared (MANOVA; ANOVA, post-hoc tests) across groups to determine what differentiates the ADHD-Maybe from the other 2 groups.

Results: Groups did not differ for age, race or gender distrbution, but the ADHD-Maybe group had 1.5 years less education ($p < .05$). MANOVA analyses revealed satistically significant differences across groups on several variables. ANOVA and post hoc analyses identified several variables where the ADHD-Maybe group differed from *both* the ADHD-Yes and ADHD-No groups: ADHD-Maybe group had greater reaction time variability on the CPT-3, reported more Hyperactivity on the CAARS-S:L, greater Behavioral Dysregulation on the BRIEF-A, and more Borderline Personality Features on the PAI than the ADHD-Yes and ADHD-No groups. They were also more likely to display less-than-optimal effort.

Conclusions: Relative to the ADHD-Yes and ADHD-No groups, adults with equivocal diagnosis of ADHD are more likley to demonstrate less-than-optimal performance effort on testing, greater variablity of reaction time on an objective test of attention, and report more symptoms of hyperactivity, behavioral dysregulation, and borderline personality features. Overall, the ADHD-Maybe group reports more behavioral symptoms than those who do or do not definitively meet accepted ADHD diagnostic criteria.

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B.J. FERGUSON, M.M. MCBRIDE, D.C. WANG, A.N. ZAND & D.Q. BEVERSDORF. The Effects of Methylphenidate on Verbal Creativity and Problem-Solving Abilities in Individuals with Attention Deficit Hyperactivity Disorder.

Objective: Creativity, or the ability to generate ideas that are both novel and useful, is associated with a decreased signal-to-noise ratio in the brain that results in defocused attention. Reductions in attention are the hallmark of attention deficit hyperactivity disorder (ADHD), which may facilitate creativity. One of the most common treatments for ADHD is methylphenidate (MPH), a central nervous system stimulant, which targets the noradrenergic system to increase arousal, which may have positive effects on some domains of creativity and problem solving in ADHD. However, the effect of methylphenidate on verbal creativity and problem-solving abilities is unclear. Therefore, the present study examined the effects of MPH of performance on problem solving tasks and verbal creativity in individuals diagnosed with ADHD.

Participants and Methods: Participants (n=9, range=18-40, age=26.3, SD=7.01, 3 females, all Caucasian) with a diagnosis of ADHD and who are currently prescribed and taking MPH for their ADHD were recruited. Participants attended one session while on their MPH and one session while not on their MPH. During both sessions, participants completed problem-solving tasks (anagrams, compound remote associates, letter & category fluency) and the Verbal Torrance Test for Creative Thinking (V-TTCT).

Results: Initial analyses indicate significant reductions in solution latency time for the anagrams task ($p = 0.008$) and significant increases in originality on the V-TTCT ($p = 0.049$). Furthermore, trends toward significance were revealed for flexibility and the total battery score on the V-TTCT.

Conclusions: The results from this initial sample in this ongoing study suggest that MPH may increase some domains of verbal creativity and problem-solving abilities in those with ADHD.

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A. GRANT, J. LACE, C. TEAGUE, P. RUPPERT, A. GARNER & J. GFELLER. Performance Validity Tests in College Students Feigning ADHD versus Depression and Anxiety.

Objective: Failed performance on performance validity tests (PVTs) is common in those seeking an attention-deficit/hyperactivity disorder diagnosis (ADHD; Sullivan et al., 2007). Symptoms commonly reported by those feigning cognitive impairment include depression and anxiety (Sharland et al., 2017). ADHD has overlapping symptoms with anxiety and depression, making a comparison study of these conditions important. Standalone and embedded PVTs were administered to examine differences in how individuals feigning presentations of ADHD and affective symptoms performed as well as individuals who were instructed to respond honestly and to the best of their ability to determine the classification accuracy of previously identified cut-off scores.

Participants and Methods: Participants were 75 undergraduate Saint Louis University psychology students ranging from 18-26 years old with most participants being White (76%) females (61%). Participants were randomly assigned to one of three groups: 1) coached to feign ADHD symptoms (ADHD group); 2) coached to feign symptoms of depression and anxiety (DA group); and 3) optimal effort control

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(OC group). Performance validity was assessed using the Word Choice Test, Dot Counting Test, Reliable Digit Span, and the Connors Continuous Performance Test III.
Results: The ADHD group performed more poorly than the DA group, though the DA group performed worse than the OC group. Sensitives for included measures were low (.02-.40). Results indicated the Word Choice Test was the most effective indicator for detecting feigned ADHD as well as feigned depression and anxiety, with both the highest sensitivity (40%) and specificity rates (100%).
Conclusions: Overall, the DA group performed better than the ADHD group, but worse than the OC group on PVT indicators. However, a pattern of generally low sensitivity was found with the cut-off scores used in the present study. Thus, multiple indicators and methods should be used by clinicians to make inferences about insufficient effort during neurocognitive testing.
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J. KIM & C.L. HAAK. Neuropsychologists' Beliefs Regarding Assessing and Diagnosing Attention-Deficit/Hyperactivity Disorder (ADHD).
Objective: ADHD is in the top 5 most commonly referred diagnostic considerations among child, adult, and lifespan neuropsychologists since 2010 (Sweet et al., 2015). As a result, neuropsychology is playing an increasing role in diagnosis of ADHD. Clinicians' opinions regarding ADHD affect their approach to diagnosing ADHD. Therefore, the present study examined neuropsychologist's current beliefs about diagnosing ADHD.
Participants and Methods: The present study used data from 119 neuropsychologists who responded to a survey posted on multiple professional listservs. Data was collected regarding demographics, professional training, and beliefs about ADHD including whether full criteria must be met, age of onset, if the current age of onset is appropriate, and if ADHD can emerge in adulthood. Opinions about use of neuropsychological testing and use of performance validity tests (PVTs) were explored.
Results: The average age of neuropsychologists surveyed was 42.1 (SD = 10.3), 64.7% were female, and 94% of the sample identified as Caucasian. Regarding professional development 84.2% of the sample completed an APA or CPA accredited internship, 80.3% completed a postdoctoral fellowship, and 36.1% were board certified.
Among neuropsychologists, 28.6% strictly applied full criteria for ADHD diagnosis, while 63.9% endorsed usually requiring full criteria to be met. Only 66.4% believed the current age cutoff for development of symptoms is appropriate. Regarding utility of neuropsychological assessment 90.8% believed it was helpful but 53.8% did not believe it was necessary for diagnosis. When testing, 60.5% always use PVTs. Belief that ADHD is over-diagnosed was 82.4%.
Conclusions: The present study identified differences in beliefs regarding use of full criteria, age of onset, utility of neuropsychological assessment, and use of PVTs for diagnosing ADHD. Further research regarding how these beliefs influence the likelihood of ADHD diagnosis is required. In addition, areas lacking consensus among clinicians warrants attention.
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L.D. HAISLEY, A. HEFFELFINGER & J. KOOP. Attention in Very Young Children with Neurological Injury Versus Typically Developing Peers.
Objective: Children who experience early neurological injury are at increased risk for attention problems but, we often do not identify problems until they enter school. This study examined attention (formal measure/parent report) in matched samples of children who experienced early neurological injury and typical peers.
Participants and Methods: CONTROL/NEURO (n=26 each), matched for age (M = 26.31, S =15.96) and gender. NEURO experienced an early neurological injury known to increase risk for attention problems: TBI, stroke, seizures.
Assessed attention using the Early Attention Task (Ruff & Lawson, 1990) including Single and Multi-toy conditions. The child's attention (Casual, Focused, Off-Task) was coded for 5-second epochs over 8 minutes. Children's behavior/attention problems were rated by parents using the Children's Behavior Questionnaire.
Results: Age negatively correlated with Casual attention (r = -.41, p= 04; r = -.49, p=. 01) and positively correlated with Focused attention (r=.63, p=001; r =.40, p=.04) in both groups for the Single Toy condition. In the Multi-Toy, age correlated with Focused attention in the CONTROL group (r = .50, p = .01), but not NEURO.
There were no significant differences between the CONTROL and NEURO groups in Focused, Casual or Off-Task attention in either Single or Multi-Toy.
Parent rated Activity Level was higher in the NEURO group (U=215.50, p=.04); no difference in parent-rated Attentional Focusing. Attentional Focusing correlated with Casual and Focused attention in the CONTROL group, but not the NEURO group.
Conclusions: Hypothesized differences were not seen on formal measures of attention, but there were differences in parent-rating. While the CONTROL group demonstrated the expected relationship between age, focused attention, and parent rating, the NEURO group's pattern was less clear. Our results support that the developmental trajectory for children with neurological injury is different, and that parent report of motor activity may be an early symptom of attention problems.
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M.N. HARRELL, S. TAYLOR, J.D. BEACH, S.L. AITA & B. HILL. The Mediating Effects of Dysfunctional Personality Traits on Need for Cognition and ADHD Symptomology.
Objective: Objective: This study examined the relationship between dysfunctional personality traits, need for cognition, and ADHD symptomology.
Participants and Methods: Participants and Methods: Participants were 200 college students (66.0% female; 53.5% Caucasian, 33.5% African American, 4.5% Asian, 4.0% Other; age range 17 – 46 years, M_{age} = 19.51 years, SD = 3.30) who completed the following attention tasks: Need for Cognition scale (NFC), the Personality Inventory for DSM-5 (PID), and the Barkley Adult ADHD Rating Scale-IV (BAARS-IV).
Results: Results: Regression analyses were performed in order to investigate if dysfunctional personality traits mediated the effect of need for cognition on ADHD symptomology. Mediation analyses were tested using 5000 bootstrapping resamples with bias-corrected 95% confidence estimates. The overall total effect between NFC and BAARS-IV was significant, $F(1,198) = 4.23$, $p < .05$, $r^2 = .02$, 95% CI = -.28, -.06) not accounting for the effect of the mediators. The model was significant when examining the relationship between the independent variable, mediators, and dependent variable, $F(6,193) = 7.70$, $p < .000$, $r^2 = .19$. Specifically, two of the five mediators demonstrated significant indirect effects on ADHD symptomology: disinhibition, (B = -.462, t (193) = 4.97, p = .000, 95% CI = .28, .65) and antagonism (B = -.20, t (193) = -2.32, p = .02, 95% CI = -.36, -.03). Finally, results indicated that the direct effect of NFC and BAARS-IV was not significant (B = -.007, t (193) = -.09, p = .93, 95% CI = -.15, .14) when controlling for all five mediators, confirming a full mediation.
Conclusions: Conclusions: These results highlight the effects of dysfunctional personality traits on the relationship between NFC and self-report measures of ADHD symptomology. These results indicate the need for further research regarding how personality traits impact

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self-report measures of attention. Additionally, this research highlights the effects of an increased NFC on ratings of ADHD symptomology.
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R. HINOJOSA. ADHD and Set Shifting: A Meta-Analysis Investigating Performance Differences on the Trailmaking Test.
Objective: Using meta-analysis, the purpose of this study is to examine performance differences on measures of executive function, specifically set shifting, between individuals with ADHD and healthy controls.
Participants and Methods: Studies published between 1994 and 2018 were retrieved from two primary, online databases: PsycINFO and MEDLINE (PubMed). Using designated search terminology, 808 records were retrieved. Next, 212 duplicates were detected and removed from the sample, leaving 596 records to screen. Four hundred eighty studies met exclusion criteria. A total of 116 abstracts were assessed full-text, from which 27 studies were retrieved. From that pool, 16 additional studies were identified. The final sample contained 43 studies.
Studies included in the present analyses referenced the mean scores and standard deviations of variables specific to the Trailmaking Test for people with ADHD and healthy controls. The age of participants ranged across the lifespan. Variables most prevalent across the literature were the total time to complete Part B (Trails B) and B-A index (B-A), both of which were retained for the present study.
Results: Accounting for within- and between-study variances, the method of moments random effects was utilized. Using Hedges *g*, 25 studies yielded statistically significant effects ($-0.82 \leq g \leq 5.89$, $p < .05$). Across the Trails B and B-A variables, age, study quality, and IQ as a covariate significantly moderated the overall effects. Regarding child and adult studies, performance differences (Trails B) and within-group variability (B-A) reached statistical significance.
Conclusions: To the author's knowledge, this is the first study to isolate the meta-analysis of performance differences on the Trailmaking Test between people with ADHD and healthy controls. It is intended that this study will help others better understand the nature of executive dysfunction in ADHD.
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J.S. HOLCOMBE. Surviving High School with ADHD and EFD: A Mixed Methods Study Exploring How Students and Parents Perceive Attention Deficit Hyperactivity Disorder and Executive Functioning DeficitsImpact Academic and Daily Life.
Objective: Objective: The purpose of this mixed methods study was to explore how students and parents perceive ADHD and self-reported executive dysfunction impact academic and daily life in a clinical population.
Participants and Methods: Participants and Methods: 14 students (57.10% female; *M* age = 17.86, *SD*= .66; *M* education=12.0, *SD*= 0.00; 50.0% White, 42.9% African American, 7.1% Asian) who participated in a state sponsored College Prep Week completed the BDEFS-SF:SR and the BAARS-IV-SR: Quick Screen.
Results: Results: Pearson correlations for students revealed significant positive relations between BAARS Current Symptoms and BDEFS on subscales Self-Management to Time, r = .86 ($p < .01$); Self Restraint, r = .58 ($p < .05$); total r = .76 ($p < .01$); and symptom count, r = .82 ($p < .01$). The student BDEFS subscales were entered into a multiple regression to predict Current Symptoms BAARS. This model explained 42.1% of the variance in Current Symptoms BAARS (R^2=.579, $F(1,11) = 15.13$, $p<.01$). Only the BDEFS Self Restraint subscale of both student and parents significantly predicted BAARS (β =.58, p=.037) and (β =.65, p=.022) respectively.
Conclusions: Conclusion: Current symptoms of ADHD were most significantly related to the Self Restraint subscale of the BDEFS for both students and parents. In follow-up interviews, this was also confirmed as being the most problematic executive dysfunction symptom as reported by both students and parents using thematic analysis and by quantifying the transcript portions related to self -restraint.
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C. HYDE, E. SCIBERRAS, D. EFRON, I. FUELSCHER & T. SILK. Reduced fine motor competence in children with ADHD is associated with atypical microstructural organization within the superior longitudinal fasciculus.
Objective: Recent work in healthy adults suggests that white matter organization within the superior longitudinal fasciculus (SLF) may at least partly explain individual differences in fine motor skills. While attention deficit hyperactivity disorder (ADHD) is primarily characterized by inattention, impulsivity and/or hyperactivity, atypical fine motor control is a common feature. Neuroimaging work often implicates the SLF in the neurobiological underlying ADHD as part of the attention network connecting frontal and parietal regions. Therefore, the aim of the present study was to investigate the association between reduced fine motor skill in ADHD and microstructural properties within the SLF.
Participants and Methods: Participants were 55 right handed children with a lifetime history of ADHD currently free of medication and 61 healthy controls aged 9- 11 years. Fine motor control was assessed using the well-validated Grooved pegboard task. All children underwent high angular resolution diffusion MRI. Following pre-processing, constrained spherical deconvolution tractography was performed to delineate the three SLF branches bilaterally.
Results: Children with ADHD showed significantly poorer fine motor performance relative to controls, but only for their non-dominant hand as shown by significantly slower left handed performance on the pegboard task. This slower response time for the non-dominant (left) hand was significantly associated with reduced apparent fibre density within the right SLF I, as well as reduced volume within right SLF I and II and left SLF I and III. This finding was independent of spatial attention performance.
Conclusions: This study demonstrated that children with ADHD have poorer fine motor performance in their non-dominant hand, and that this poor fine motor control was associated with differential white matter properties within the SLF, most notably the right SLF I. This suggests that anomalies in fronto-parietal white matter may have broader implications than attention.
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L.N. IRWIN, E.L. WELLS, E.F. SOTO, N. GROVES & M.J. KOFLER. Working Memory and Information Processing in Attention-Deficit/Hyperactivity Disorder.
Objective: Attention-Deficit/Hyperactivity Disorder (ADHD) has been linked with impaired performance on a wide range of neuropsychological tests indicating that ADHD may be associated with a variety of neurocognitive deficits. However, the data may be explained more parsimoniously by a small number of impairments that broadly influence test performance in children with ADHD. The aim of the study is to experimentally manipulate both working memory and information processing demands to test competing, model-driven hypotheses regarding the directionality of these impairments in ADHD.
Participants and Methods: The current study used eight computerized tasks with stimuli that were chosen to provide robust manipulations of working memory and information processing demands (animal/emotion span, animal/emotion context span, animal/emotion recognition, animal/emotion context recognition) in a well-characterized sample of 86 children ages 8-13 with ADHD (n=46) and without ADHD (n=40).

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The proportion of stimuli correct per trial (% correct) was used to assess working memory capacity. Drift rate (v) is the primary indicator of information processing speed and refers to the speed of information uptake.
Results: The ADHD group demonstrated impairments in both working memory (Cohen'sd=0.74, BF_{10}=30.92, p=<.001) and information processing speed (drift rate; d=0.64, BF_{10}=8.98, p=.004). Bayesian mixed-model ANOVAs indicated that increasing working memory demands evoked significant decrements in the speed of information accumulation (drift rate; BF_{10}=6.19, p<.05). In contrast, increasing information processing demands did not significantly change working memory performance, such that the data were almost equally likely under the null and alternative hypotheses (BF_{10}=1.60, p>.05).
Conclusions: These findings indicate that top-down executive control exerts significant effects on the speed of basic information processing. The hypothesis that slowed information processing would reduce working memory capacity in ADHD was unsupported.
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E. LONDEN, C.F. CERTILMAN, T. PRESTON, E. ROSEMAN, C. O'BRIEN & B. LEBOWITZ. Self-Reported Depression Negatively Impacts Sustained Attention in Adults.
Objective: Poor sustained attention is a common feature of many neurological, general medical, and psychiatric conditions. Individuals with Attention-Deficit/Hyperactivity Disorder (ADHD) often have particular difficulty performing sustained attention tasks. The Integrated Visual and Auditory Continuous Performance Test (IVA+) is a sustained attention measure often used in the context of clinical ADHD evaluations. Although research has indicated that psychological factors such as depression can be associated with concentration difficulties, there is a paucity of prior research examining whether depression can impact sustained attention as measured by the IVA+. The current study sought to examine whether those with greater endorsement of depression perform worse on IVA+ sustained attention indices.
Participants and Methods: The current sample consisted of 123 adults (mean age = 44.48 years; *SD*= 16.08) referred by their treating physicians for evaluation of cognitive concerns. As part of their clinical assessment, these patients were administered the IVA+ and Beck Depression Inventory, 2nd Edition (BDI-II).
Results: Higher scores on the BDI-II significantly predicted lower scores on the IVA+ Sustained Auditory Attention Quotient (SAAQ; b = -.95, p <0.01), and Sustained Visual Attention Quotient (SVAQ; b = -.73, p = 0.03). Further, individuals who endorsed moderate to severe levels of depression on the BDI-II performed significantly worse on the SAAQ when compared to individuals with minimal to mild symptoms (t = 2.11, p =0.03).
Conclusions: The current study suggests that depression may play a role in poor sustained attention as measured by the IVA+. Thus, interpretation of poor IVA+ scores as indicative of ADHD requires that the contribution of other factors, such as depression, be considered.
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D.E. MARRA, M.E. NITTA, E.M. VOGT, K.A. RITCHIE, P. MARSHALL & J. HOELZLE. Psychometric Investigation of the Barkley Deficits in Executive Functioning Scale-Short Form (BDEFS-SF).
Objective: Emerging research documents the utility of self-reported executive functioning scales in diagnosing adult attention-deficit/hyperactivity disorder (ADHD), and some posit that executive function (EF) behaviors are as central to ADHD as sustained attention. The Barkley Deficits in Executive Functioning Scale (BDEFS) was developed to evaluate functional impairments related to EF. While a five-dimensional factor structure of the BDEFS is well-documented, the factor structure of the BDEFS short form (BDEFS-SF) is unknown.
Participants and Methods: Two-hundred and four adult patients (M_{age} = 26.07, SD = 7.59; $M_{education}$ = 14.42, SD = 1.59; 57% male; 73.9% Caucasian) completed the 20-item BDEFS-SF as part of a multimodal ADHD assessment in a neuropsychology clinic. Principal components analysis (with oblimin rotation) was conducted to identify underlying dimensions of executive functioning. Component retention decisions were based upon parallel analysis.
Results: In contrast to the BDEFS long-form, parallel analysis suggested the retention of four components. The four-factor structure accounted for approximately 62% of the total variance and the dimensions were minimally correlated (all r's < .30). The extracted dimensions reflected (1) self-restraint/inhibition (2) self-motivation (3) self-regulation of emotion, and (4) self-organization/problem solving.
Conclusions: This research evaluated the psychometric properties of the BDEFS-SF in a large clinical sample of adults evaluated for ADHD. A four-factor structure was retained that captured distinct, multidimensional aspects of executive functioning. In contrast to the extended version, the current four-factor structure did not include a dimension for self-management of time. Discrepant findings may be due to differences in the study sample from the normative population. Nonetheless, future research should investigate the predictive validity and correlates of the BDEFS-SF components.
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A.M. MICHALEK & J. ROCHE. Exploring Pupillometry as a Measure of Attention during Audiovisual Speech Processing for Adults with ADHD.
Objective: Adults with and without ADHD demonstrate a commensurate ability to process speech in the presence of fluctuating levels of background noise when no audiovisual cues are present, however; differences between adults with and without ADHD are evident when audiovisual speech cues are included (Michalek et al., 2014). This pilot study: 1) explored the feasibility of pupillometry as a measure of attention for adults with ADHD; 2) explored eye gaze patterns of adults with ADHD in comparison to adults without ADHD during audiovisual speech processing.
Participants and Methods: Five adults without ADHD and five adults with ADHD (ages 18-35) participated in the Quick speech-in-noise test with concurrent visual cues. Participants viewed a video of the talker's face on a computer screen while hearing sentences presented across six signal-to-noise ratios – 25, 20, 15, 10, 5, 0 dB. Each adult was seated in front of a computer monitor when viewing the talkers face so that eye gaze metrics could be collected. For each video, a total of 54 static scenes were created for each adult and contained two areas of interest (AOIs) - eye/nose and mouth/lips.
Results: The results of a linear effects model indicated a significant main effect of the mouth/lips AOI (b = 32.73, se = 8.259, t = 3.963, p < .001). The main effect of mouth/lip AOI, indicates that as fixations increase to the mouth, the size of the pupil also increases. However, pupil size is significantly smaller to the mouth region for the adults without ADHD when fixating the mouth, relative to adults with ADHD.
Conclusions: The results of this study support the use of eye tracking technology as a measure of visual attention and a way to detect differences in attentional resource allocation during cognitively demanding tasks for adults with and without ADHD. While adults with ADHD are looking at the features of the face which communicate sound cues (i.e. mouth/lips), they are not allocating resources similarly to adults without ADHD.
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K.S. ROSCH, C. BUCKLESS, D. CROCETTI, K. SEYMOUR & S. MOSTOFSKY. ADHD-Related Sex Differences in Frontal and Subcortical White Matter Microstructure and Associations with Delay Discounting.

Objective: Delay discounting (a stronger preference for smaller immediate over larger delayed rewards) is a central feature of pathological behavior associated with impulsivity, including ADHD. Structural connectivity in fronto-subcortical neural circuitry may relate to individual differences in delay discounting. The current study employed diffusion tensor imaging (DTI) to compare white matter microstructure in fronto-subcortical regions of interest (ROIs) among girls and boys with ADHD compared to typically developing (TD) children and to examine correlations with delay discounting.

Participants and Methods: Participants included 8-12 year-old children with ADHD (n=78; 53 boys) and TD controls (n=78; 55 boys). Measures of fractional anisotropy (FA) in the frontal ROIs, including bilateral dorsolateral prefrontal cortex (dlPFC), anterior cingulate cortex (ACC) and orbitofrontal cortex (OFC) and subcortical ROIs, including bilateral striatum and amygdala, were compared across groups and in relation to delay discounting.

Results: Among frontal regions, a Diagnosis x Sex interaction for the OFC (p=.002) indicated increased FA among girls with ADHD compared to TD girls (p=.039) and decreased FA among boys with ADHD compared to TD boys (p=.011). Girls with ADHD also showed increased FA in the ACC compared to TD girls (p=.024), whereas no diagnostic group differences were observed in the dlPFC. In contrast, boys with ADHD showed reduced FA in the striatum (p=.001) and amygdala (p=.004), whereas no diagnostic effects were observed among girls. Brain-behavior correlations examined across the entire sample indicated that greater dlPFC FA correlated with decreased delay discounting (r=-.19, p=.013).

Conclusions: Girls and boys with ADHD show distinct patterns of anomalous white matter microstructure in the PFC whereas subcortical anomalies are specific to boys with ADHD. Further, individual differences in delay discounting are related to white matter microstructure in the dlPFC, a brain region involved in executive functions.

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R.M. SCHUSTER, J.M. GILMAN, K. POTTER, M. HARELI & G. FORCHELLI. Dissociative Relationship Between ADHD Subtypes and Neurocognitive, Academic, Emotional and Adaptive Functioning: Preliminary Analyses from the Adolescent Brain Cognitive Development (ABCD) Study.

Objective: Attention-Deficit/Hyperactivity Disorder (ADHD) is a common and heterogeneous neurodevelopmental disorder. It is not known whether the 3 diagnostic subtypes, predominately inattentive (ADHD-I), predominately hyperactive-impulsive (ADHD-H), and combined presentation (ADHD-C), have distinct profiles of neurocognitive, emotional, and behavioral functioning.

Participants and Methods: This study of 8-10 year olds from the Adolescent Brain and Cognitive Development (ABCD) Study first data release included372 ADHD-I, 95 ADHD-H, 340 ADHD-C, and 3,717 controls. The Kiddie Schedule for Affective Disorders and Schizophrenia for DSM-V assessed ADHD status (17.8% of the overall sample of 4,524 participants) and academic performance. Composite scores from the NIH Toolbox were analyzed and included total score, crystallized intelligence and fluid intelligence. Dimensional psychopathology and adaptive functioning were measured with the Achenbach Child Behavior Check List.

Results: ADHD-I and ADHD-C had worse total cognition, lower fluid intelligence, poorer academic performance, and were more likely to receive academic accommodations than controls and ADHD-H (p's<0.002). ADHD-I and ADHD-C had lower crystallized intelligence than controls (p's<0.007). ADHD-H had comparable total cognition, fluid intelligence, and academic outcomes to controls (p's>0.55). ADHD-C had worse emotional and adaptive functioning than other ADHD subtypes or controls (p's<0.001). Past year detentions/suspensions were 6-fold higher in ADHD-C than controls, while those with ADHD-I and ADHD-H showed a 2- and 3-fold increase compared to controls.

Conclusions: Inattentive but not hyperactive symptoms are associated with poorer cognitive performance and difficulties in school. In contrast, those with symptoms of *both* inattention and hyperactivity have greater difficulties with emotional and adaptive functioning. Future studies will examine neural signatures and long-term functioning trajectories by ADHD subtype.

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S. MACOUN, J.C. SHEEHAN, S. ALI, D. HALLIDAY, S. MACDONALD, A. DEAN & E. VAAGE. Simple vs. Complex Motor Task Performance in Children With ADHD.

Objective: Attention-Deficit Hyperactivity Disorder (ADHD) has been theorized as a disorder of neural systems regulating motor control. Disparate findings among motor tasks suggest that motor function in ADHD may be differentially impacted according to task demands. We examined performance on simple and complex motor tasks in children with ADHD compared to typically developing (TD) controls, anticipating that those with ADHD would have difficulties on a complex motor task, yet display intact simple motor function.

Participants and Methods: Participants included TD children (n=46) and those with a pre-existing diagnosis of ADHD (n=33) ages 6-13 years, screened for other disorders and matched on age/IQ. ADHD diagnosis was confirmed with the KSADS and parent/teacher rating scales (DuPaul 5). Participants completed measures of simple fine motor performance (Grooved Pegboard/GP and Finger-Tapping/FT) and a complex measure of motor function (Mirror Drawing Task/MDT).

Results: On the control condition of the MDT, children with ADHD committed more errors, t (77) = -2.69, p < .05, so initial analyses covaried out control task performance. A MANOVA was used to compare performance on motor tasks between the ADHD and control groups, which revealed a statistically significant difference, F (3, 59) = 3.76, p < .05; Wilk's Λ = .839, partial η^2 = .16. Follow-up univariate analyses revealed that the ADHD group performed more poorly on the complex motor planning task (F(1, 66)=1.21, p< .05), with no significant between-group differences on basic motor tasks.

Conclusions: Children with ADHD display difficulties with complex motor function/motor learning in the context of intact basic motor abilities. These results are consistent with the neural systems impacted in ADHD and research documenting executive motor control problems in this population. The relationship between complex motor abilities and ADHD symptomatology, in addition to the overlap between motor learning and inhibitory control, will be discussed.

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A.A. VAILLANCOURT, A.A. TURK NOLTY & S.S. AMANO. Attention Functioning in Adolescents with a History of Childhood Prostitution.

Objective: We examined neuropsychological profiles of adolescents exposed to prostitution to see if they had distinctive patterns within the domain of attention. It was also hypothesized that participants with PTSD would perform worse on attentional measures than those without a diagnosis of PTSD.

Participants and Methods: Archival neuropsychological data from 19 adolescents with a history of prostitution were utilized. Ages ranged from 14 to 18 years (M = 16.1). Eleven participants met the DSM-5

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criteria for PTSD and 3 for ADHD. Neuropsychological tests included D-KEFS subtests and the Conners Continuous Performance Test (CPT).
Results: Compared to the standardization sample, adolescents with a history of prostitution tended to be slower on the D-KEFS Trail Making Letter-Sequencing test (p = .12). On the CPT subtests, they had fewer omissions (p = .15), a smaller hit rate reaction time standard error (p = .14), and less variability (p = .07). When the co-morbid diagnosis of ADHD was controlled, there was an additional trend regarding increased efficiency in information processing (CPT hit reaction time block change, p = .06). Finally, participants with a diagnosis of PTSD performed significantly faster on the D-KEFS Trail Making Number Sequencing test (p = .01) than those without a PTSD diagnosis.
Conclusions: Consistent with literature linking trauma with hypervigilance, adolescents with a history of childhood prostitution were able to respond to the appropriate stimuli with less missed targets, higher consistency, and stronger vigilance than the standardized population. Contrary to expectations, a formal diagnosis of PTSD was not consistent with worse attentional functioning even when controlling for ADHD. These findings suggest the importance of understanding the unique neuropsychological profile of this population for effective intervention, as adaptive skills necessary for the survival of trauma (e.g., increased vigilance and awareness) and psychopathology associated with trauma may overlap.
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A.E. VELEZ, C.A. SANDOVAL, E. LIZARRAGA & D. RODRIGUEZ. Attentional impairment patterns in patients with non-alcoholic Hepatic Cirrhosis.
Objective: The aim of this study was to identify and describe attentional impairment patterns in patients with minimal hepatic encephalopathy who are waiting for a liver transplant.
Participants and Methods: In this study, the performance of 10 adult patients diagnosed with hepatic cirrhosis who are waiting for a liver transplant was assessed by means of a Neuropsychological battery: "*NEUROPSI: Atención y Memoria*". Qualitative and descriptive statistical analyses
(successes, errors, intrusions and perseverations) were performed to find out the similarities and differences among patients profiles to find out a general attentional impairment for this sample.
Results: The results indicate that the tasks belonging to the Anteior Attention Network proposed by Posner & Petersen model, show a poor performance, so process such as attention control, intentional motor and inhibition are the most affected.
Conclusions: According to the results of all the patients, they reveal that there is a slight cognitive impairment in comparison with the population norm of the Neuropsychological battery, so it is suggested that more evaluations be carried out with different stages of the disease in order to have a better knowledge of the deterioration of cognitive functions in patients with non-alcoholic Hepatic Cirrhosis.
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G. VITALE, V. TRAN, D. AMEN, K. WILLEUMIER, D. TAYLOR & C. GOLDEN. Regional Cerebral Blood Flow Patterns in Children vs. Adults with ADHD Combined and Inattentive Types: A SPECT Study.
Objective: The current study sought to determine whether ADHD Combined Type (ADHD-C) and ADHD Primarily Inattentive Type (ADHD-PI) showed differential regional cerebral blood flow (rCBF) patterns in children vs. adults.
Participants and Methods: The overall sample (N=1484) was effectively split into four groups: adults with ADHD-PI (n=519), adults with ADHD-C (n=405), children with ADHD-PI (n=192), children with ADHD-C (n=368). All participants were void of bipolar, schizophrenia, autism, neurocognitive disorders, and TBI. The data were collected from a de-identified archival database of individuals who underwent SPECT scans at rest.
Results: Using α<.01, a 2X2 MANOVA revealed significant main effects for both ADHD type and age group; however, the overall interaction effect was also significant (Wilks' Λ=.966, $F(16,1465)$=3.21, p<.001, ηp^2=.034). Children with ADHD-C showed higher perfusion than all other groups in the left parietal and bilateral sensorimotor areas and lower perfusion than all other groups in the bilateral cerebellum. Children with ADHD-C also showed higher perfusion than children with ADHD-PI in the bilateral limbic areas.
Conclusions: Overall, the current study suggested that children may show rCBF differences between different ADHD subtypes, but adults may not. The current study did not find significance in any of the 17 brain regions examined when comparing adults with ADHD-C to adults with ADHD-PI. All significant findings were attributed to the children with ADHD-C group showing aberrant blood flow rate than at least one other group. Previous research has supported that the differentiation of these subtypes as distinctive disorders is difficult to make in adults (Sobanski et al., 2006). Other research has indicated the potential of imaging techniques to differentiate the two in children (Al-Amin, Zinchenko, & Geyer, 2018). The current findings support nuanced ways in which rCBF patterns of ADHD-C and ADHD-PI differ between children and adults.
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Autism Spectrum Disorders/Intellectual Disability

T.O. ALABI, J. NOFER, A.R. SMITH & J.B. EISENGART. Resolution of Autism Spectrum Disorder Following Hematopoietic Stem Cell Transplantation for Diamond-Blackfan Anemia.
Objective: Diamond-Blackfan Anemia (DBA) is a rare genetic disorder characterized by red cell aplasia. Hematopoietic stem cell transplantation (HCT) is the only curative treatment for this potentially fatal disorder. We present the unusual case of a boy who had DBA and comorbid autism spectrum disorder (ASD), and track his neuropsychological outcomes following allogeneic HCT.
Participants and Methods: The patient is a 5-year-old boy who was born with bilateral thumb abnormalities and hydronephrosis. He was diagnosed with DBA at 4 months old and pervasive development disorder, NOS at age one. He underwent an unsuccessful allogeneic HCT in November 2016 followed by successful HCT in March 2017. Data from retrospective chart review was gathered from neuropsychological (November 2016) and neurodevelopmental (February 2018) evaluations.
Results: Pre-HCT evaluation showed age-appropriate cognitive development except for attention, social, and self-regulation skills. Symptoms consistent with Autism Spectrum Disorder (ASD) included reduced interest in social interactions, difficulty with reciprocal conversation, nonverbal communication deficits, inflexible behaviors, stereotyped motor mannerisms, and sensory sensitives. Following HCT, formal evaluation using gold-standard diagnostic instruments confirmed that while ASD was present prior to HCT, this diagnosis was no longer appropriate afterward. Residual weaknesses in abstract reasoning, socio-emotional reciprocity, and anxiety remained.
Conclusions: The patient's ASD symptoms appeared to be resolved coincident with successful allogeneic HCT. This case supports the need for further investigations of novel treatments for autism.
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A.O. ALEXANDER, A. JULIANO, J. DELUCA, L. HENDRIX & H. GENOVA. School Based Mindfulness and Changes in Everyday Executive Functioning Skills of Students with Autism Spectrum Disorder.

Objective: Children with Autism Spectrum Disorder (ASD) have difficulties with executive functioning (EF) that impact many aspects of life. This pilot study sought to determine if participation in a school-based mindfulness training program (SBMTP) would improve everyday EF skills in children diagnosed with ASD.

Participants and Methods: Participants included 25 children with ASD (mean age =13.72 ± 1.67) who completed an eight-week SBMTP. Children and their parents completed the Behavior Rating Inventory of Executive Function, Second Edition (BRIEF-2), among other measures. A paired samples t-test examined changes before and after SBMTP.

Results: Following the SBMTP, parents reported improvements in their child's interpersonal awareness [$t(24) = 2.797$, $p = 0.010$, $d = 0.56$], task-checking behaviors [$t(24) = 2.191$, $p = 0.038$, $d = 0.44$], emotional regulation [$t(24) = 2.203$, $p = 0.037$, $d = 0.44$], and overall executive functioning [$t(24) = 2.690$, $p = 0.013$, $d = 0.54$]. Students reported improvements in their perceived ability to manage current and future-oriented task demands [$t(24) = 2.874$, $p = 0.008$, $d = 0.57$].

Conclusions: Following the children's participation in a SBMTP, parents reported improvements in multiple areas of their child's EF, while children with ASD reported improvements primarily in their ability to plan and organize. Consistent with prior research involving typically-developing children, these findings suggest that participation in a SBMTP can lead to improvements in everyday EF for children with ASD. Although there was no control group in the current study, engaging in a SBMTP holds promise as a cost-effective intervention to improve EF in children with ASD. Additional research is needed to determine if improvements generalize to other functional outcomes.

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A. ARMOUR, G. WALLACE, M.S. QUIDZINSKI, A. VERBALIS, A. RATTO, Y. MYRICK, M. BERL & L. KENWORTHY. Executive Function Profiles in Children with Autism Spectrum Disorder and/or Intellectual Disability.

Objective: Do executive functioning (EF) profiles exist among groups of individuals with Autism Spectrum Disorder (ASD) &/or Intellectual Disability (ID)?

Participants and Methods: 290 participants (108 female) age 6-18.92 yrs (M=11.52, SD=3.38) were selected from databases of children's hospital clients, restricted to those with ASD &/or ID (IQ/adaptive functioning scores equal to/below 75) & peers without ASD/ID presenting for clinical evaluation:

G1. ASD, ID;
G2. ASD, Not ID;
G3. Not ASD, ID;
G4. Not ASD, Not ID.

G1 & G2, & G3 & G4 matched on age & gender ratio. There were no sig. differences between groups on age; G1 & G2 differed sig. from G3 & G4 on gender. Parent-reported Behavior Rating Inventory of Executive Function (BRIEF) scales were analyzed with a mixed-model ANOVA.

Results: There was a group by BRIEF scale interaction ($p<.001$). Post-hoc revealed G4 had the lowest mean BRIEF scores of all groups ($p<.001$), with no clinically elevated mean scores. Follow-up RM ANOVA showed disparate patterns across EF domains. In G1, working memory is higher than other BRIEF scales & differs from all except inhibit & shift ($p<.05$). In G3, working memory is higher ($p<.001$) than other BRIEF scales & differs from all except shift ($p<.001$). Post-hoc t-tests comparing groups on EF showed that G1 had higher mean scores than G2 on inhibit ($p<.05$), working memory (<.001), & monitor ($p<.05$). G1 had higher scores than G3 on inhibit ($p<.05$), & G2 had higher scores on emotional control ($p<.05$) & lower scores on working memory ($p<.001$) than G3.

Conclusions: Individuals with ID, with/without ASD appear to have similar EF profiles; however, not so for individuals with ASD, with/without ID. There were more reported inhibition problems in those with both ASD/ID, & on average no clinical elevations in those with neither ASD/ID. For individuals with ASD, having ID was associated with a different EF profile. ID may affect metacognition, perhaps due to verbal demands. ASD appears to be associated with behavioral regulation, consistent with prior studies.

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V. BASKETT, S. GUILLORY, E. ISENSTEIN, H. GROSMAN, C. MCLAUGHLIN, E. WILKINSON, A. DURKIN, E. FELDMAN, J. WEISSMAN, P.M. SIPER, A. KOLEVZON, J. BUXBAUM, A. WANG & J. FOSS-FEIG. An Eye-Tracking Study of Social Attention in Autism Spectrum Disorder and Phelan-McDermid Syndrome.

Objective: Phelan-McDermid Syndrome (PMS) is caused by a deletion/mutation in the *SHANK3* gene at terminal chromosome 22. The majority of individuals with PMS are diagnosed with autism spectrum disorder (ASD) and intellectual disability. ASD is characterized by impairment in social communication and repetitive behaviors. Altered attention to faces is a well-replicated finding in ASD research and is thought to underlie social deficits. Whether social attention differences in PMS mirror those in broader ASD is still unknown. This study examined visual attention in individuals with ASD and PMS.

Participants and Methods: Eye-tracking during a visual paired comparison (VPC) paradigm was completed for 50 participants (25 ASD, 17 PMS, 8 typically-developing (TD) controls). Participants viewed two identical images side-by-side during the familiarization phase. In the test phase, familiar images were then shown alongside novel images. Both social and nonsocial images were used in separate blocks. Attention and novelty preference were measured by percent looking time.

Results: TD participants showed novelty preference for both social and nonsocial stimuli ($p<0.05$). Participants with ASD showed no preference for social stimuli, but intact novelty preference for nonsocial stimuli ($p<0.05$). Participants with PMS showed no preference for either social or nonsocial novel images. Looking time during familiarization was similar for TD, ASD, and PMS individuals, indicating adequate task engagement across groups.

Conclusions: Results indicate that individuals with ASD show impaired novelty preference and attention to social, but not nonsocial, images, despite attending similarly to all images during familiarization. While there are high rates of ASD in individuals with PMS, there appear to be additional differences in attention and novelty preference in this population. These findings may help clarify shared versus divergent mechanisms in PMS and idiopathic ASD.

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J. BECK, R.A. LUNDWALL, T. GABRIELSEN, J. COX, A. DIXON, M. SPENCER, M. FARMER, T. DEMORDAUNT, L. PEACOCK, S. KAMHOUT, L. EKINS & M. SOUTH. Do Executive Functioning Skills Allow Autistic Women to Camouflage Autistic Traits?

Objective: Autistic women may "camouflage" their differences to appear more typical during social interactions and formal assessments such as the *ADOS-2*. Camouflaging may cause some to be overlooked for diagnosis of autism or misdiagnosed, delaying access to appropriate interventions. To improve diagnostic accuracy, others (e.g., Lai et al., 2016) have attempted to quantify camouflaging and explore potential mechanisms, such as executive functioning (EF) skills which allow the individual to inhibit autistic tendencies and switch to typical behaviors.

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We sought to explore a novel measure of camouflaging and its relationship with inhibition and switching abilities.
Participants and Methods: To secure a sample with a range of camouflaging abilities, we recruited through local clinics and social media women who self-reported significant symptoms on an autism screening measure (*N*=65; age *M*=24; IQ *M*=113; 24 had a previous autism diagnosis). We operationalized camouflaging by subtracting standardized *ADOS-2* scores (clinician ratings of observable autistic traits) from standardized *TASIT-S* scores (performance on video-based test of social cognition). We measured IQ and EF abilities using *WASI-II* and *D-KEFS Trail-Making* and *Color-Word Interference* respectively.
Results: More than half of participants showed camouflaging (i.e., their *TASIT-S* performance was more suggestive of autism than their behavior during the *ADOS-2*). IQ was not significantly associated with *ADOS-2* or *TASIT-S* performance. Our novel measure of camouflaging was not significantly associated with performance on EF measures.
Conclusions: Our null results may reflect a true lack of association between camouflaging and EF. Camouflaging likely recruits cognitive and motivational systems beyond EF. Notably, many participants had mild symptom presentations and so had little to camouflage, possibly contributing to a floor effect. Future directions include exploring the validity of our measure of camouflaging through a self-report questionnaire about camouflaging behaviors.
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G. BOCOBO, S.N. BUNKER & M.S. HELT. Maternal Hormone Profile and Autism Risk.
Objective: A number of isolated studies have unearthed potential risk factors for autism that are related to the *in utero* environment, such as maternal obesity, close birth spacing, history of early menarche, and increased susceptibility to hormone-related conditions. The current research sought to explore whether these risk factors can be best conceptualized in terms of the hormonal milieu that the maternal environment provides, by investigating the above mentioned factors in the same cohort, along with a number of other indicators of estrogen dominance.
Participants and Methods: The biological mothers of children with autism (n=253) and the biological mothers of typically developing children (n=221) were asked to complete an online survey designed to delineate maternal hormone profiles both before and during each pregnancy.
Results: The two groups showed significant statistical differences in their rate of estrogen influenced health indices (e.g., breast cancer, rate of hyperthyroidism, Body Mass Index, age at menarche, pre-menstrual syndrome), but not other health indices (other types of cancer, diabetes) supporting a possible connection between high maternal estrogen levels and the pathogenesis of autism.
Conclusions: The results from this study implicate maternal hormonal profiles as worthy of future study in relation to the etiology of autism. The authors discuss previous research on fetal testosterone profiles, as well as the possible effects that high maternal estrogen may have on fetal development. The authors further speculate that given the high number of hormone mimicking chemicals in the environment, changing maternal hormone profiles may give rise to increased rates of autism.
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A. CLAWSON, E.L. ESPOSITO & E.L. WODKA. Executive Functioning in Autism and Attention Deficit/Hyperactivity Disorder: Comorbidity Matters.
Objective: Deficits in executive functioning are apparent in both attention deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD), with youth with ASD and comorbid ADHD (ASD+ADHD) potentially demonstrating deficits in executive functioning that more closely resemble ADHD. We aim to build on the limited body of research involving children with ADHD+ASD and hypothesize that that youth with ASD+ADHD will perform more similarly to youth with ADHD than youth with ASD alone on measures of organization and planning.
Participants and Methods: Neuropsychological test data (Rey-O, D-KEFS Tower) for patients ages 8-21 without intellectual disability were obtained from a clinical database (ASD N=45, ADHD N=63, ASD+ADHD N=56). To measure organization, the Rey-O copy was rated based on the organizational approach of five figure elements, an experimental approach previously described in the literature; D-KEFS Tower Achievement, Rule Violation, and Move Accuracy scores were also analyzed. Separate one-way ANOVAs were used to examine group differences.
Results: Youth with ASD performed significantly better than youth with ADHD (t=2.6, p=0.01) and ASD+ADHD (t=2.2, p=0.03) on Rey-O copy. There were no significant differences between ADHD and ASD+ADHD groups (p=0.54). While there were no significant group differences for Rey-O organizational score (F=1.5, p=0.22), copy performance was correlated with the organization score and not correlated with other measures of visuomotor performance (Coding). There were no group differences for performance on Tower (ps>0.07).
Conclusions: Findings partially support prior work suggesting that executive functioning in youth with ASD+ADHD may more closely resemble those with ADHD, and that having comorbid ASD and ADHD is more impactful than having ASD alone. Group differences may also suggest that youth with ADHD have greater difficulty on tasks that are less structured (e.g., Rey-O) than youth with ASD.
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C. CORDEAUX, M. BARTON & D.A. FEIN. Understanding Treatment Engagement Following Evaluation for Early-Identified Children with Autism.
Objective: A large body of research indicates early intervention leads to better outcomes in children with Autism Spectrum Disorder (ASD); yet, few studies have quantified the time lapse or process from diagnosis to treatment. We examined factors related to treatment engagement for children diagnosed at 24 months and younger.
Participants and Methods: Participants were screened at pediatric well-visits at 12-24 months. Children who screened positive were invited for a free evaluation and received either a non-ASD diagnosis (N=12) or an ASD diagnosis (N=27) and comprehensive report with recommendations. Approximately 12 weeks following evaluation, parents were contacted for a telephone interview to assess treatment engagement (e.g., contacting providers and beginning services).
Results: 51% of parents were reached and agreed to an interview. Children of interviewees were more likely to be male and have an ASD diagnosis (p<.03). 100% had contacted providers for recommended treatment; 60% made contact within a week of evaluation, and 85% had begun or increased services at follow-up. There was an average of 127 days from screening to treatment engagement. Demographic (income, maternal education) and child (diagnosis, symptom severity, adaptive skills level, prior services) variables did not predict time to initiate contact or time to treatment engagement. Despite initiating contact, 50% of parents reported remained on a waitlist for one or more ASD-specific services and cited a number of system-level barriers to timely treatment.
Conclusions: Findings indicate that neither demographic variables historically associated with barriers to access nor child-level variables predict time to engagement with ASD treatment. Even under ideal circumstances, families face delays to timely access. Understanding patterns of treatment engagement for children who are diagnosed with ASD at early ages can inform best practices for evaluation, feedback, and referral.

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K. COULTER, D.L. ROBINS, M. BARTON, L. ADAMSON & D.A. FEIN. MSEL Performance in Children with ASD, DD, LD, and TD.

Objective: Autism spectrum disorder (ASD) is characterized by social communication difficulties and restricted or repetitive behaviors or interests. Children with ASD have also been shown to have qualitatively distinct developmental trajectories in both language and social domains. The Mullen Scales of Early Learning (MSEL) measures cognitive skills in children age 0-68 months. Although the MSEL is used extensively in evaluating children with autism or other developmental delays, it was standardized using a typically developing sample. Given the demonstrated atypical developmental trajectory in ASD, it may not be appropriate to assume the MSEL properly captures cognitive abilities in such children.

Participants and Methods: The MSEL was administered to 299 children referred for an evaluation due to ASD concern. Of those children, 107 received an ASD diagnosis, 60 language disorder (LD), 71 had a global delay (GDD), and 61 were typically developing (TD).

Results: Intrasubtest scatter was quantified by counting the number of interpolated zeros – when a child failed one item but passed the item before and after it. Controlling for total MSEL score, ASD and GDD groups showed a significantly higher rate of interpolated zeros than TD (ASD: p=.015; GDD: p=.007). There was no significant difference between LD and TD (p=.074), ASD and GDD (p=.448), or ASD and LD groups (p=.708).

Exploratory analyses indicated that the ASD group showed a greater rate of interpolated zeros on Visual Reception (p=.009) and Expressive Language (p=.012) scales. In contrast, the GDD group showed higher rates of interpolated zeros on the Fine Motor (p=.005) and Expressive Language (p=.052) scales.

Conclusions: On a standard test of child cognition, children with ASD and GDD demonstrated a higher frequency of interpolated zeros, suggesting an atypical developmental trajectory. A greater degree of intrasubtest scatter may indicate that MSEL items designed and ordered for typically developing children perform differently in children with a developmental disorder.

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S.W. DUVALL, L. HUANG-STORMS, A. PRESMANES HILL & E. FOMBONNE. No Sex Differences on the Mullen Scales of Early Learning in Young Children with Autism Spectrum Disorder.

Objective: The objective of the current study was to examine possible sex differences in cognitive functioning in a very large sample of young children with ASD.

Participants and Methods: Participants included 1,587 children (265 female) aged 18 to 68 months enrolled in the Autism Speaks Autism Treatment Network (ATN) between the years 2007 and 2013 and who were administered the Mullen Scales of Early Learning (MSEL). Age was grouped into three distinct age ranges: 18-35 months, 36-47 months, and 48-68 months. Global Early Learning Composite (ELC) and the specific domains of Visual Reception (VR), Fine Motor (FM), Receptive Language (RL) and Expressive Language (EL) were examined with T-Scores and age equivalent (AE) scores.

Results: No significant difference was found between sexes for MSEL ELC scores (χ^2= 0.08, p = .96). When T Scores for individual domains were analyzed as categorical variables (< 20, ≥ 20), there were no associations with sex. For those children who received T Scores ≥ 20 (N = 622; 102 female), Wilcoxon-Mann-Whitney tests revealed no effect of sex for any domain (VR: Z = -1.08, p = .28; FM: Z = -0.20, p = .84; RL: Z = -1.70, p = .09; EL: Z = -0.60, p = .55). No associations between sex and ELC scores or T-Scores were found for any of the three age groupings. Similarly, when chronological age was accounted for in AE scores, no effect of sex was discernable.

Conclusions: In this large clinically referred sample of young children with ASD in the United States, no significant differences were found between the sexes for the MSEL Early Learning Composite (ELC) standard score, domain T Scores or age equivalents. These findings persisted when examining different age ranges, cognitive levels and domain profiles.

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S.W. DUVALL, L. HUANG-STORMS & D. FIELDS. Sex Differences in Level of Severity Determinations in Children with Autism Spectrum Disorder.

Objective: High male prevalence in autism spectrum disorder (ASD) has resulted in fewer studies that include females, with variable findings in sex differences. Deficits associated with ASD as conceptualized in DSM-5 fall in two main domains: 1. Social communication (verbal and nonverbal communication skills, social initiation and response) 2. Restricted, repetitive behaviors and interests (inflexibility and difficulty coping with change causing functional impairment). This project examined possible gender differences in diagnosis and severity metrics in a sample of children diagnosed with ASD.

Participants and Methods: The sample consisted of 707 children who presented to an interdisciplinary autism assessment clinic between 2013 and 2018. Ages ranged from 16 months to 17 years with a mean age of 6.29 years (SD = 3.82, median = 5). Of the total sample, 346 were diagnosed with ASD and 280 of these individuals were provided with a severity level associated with their social communication deficits and restricted and repetitive behaviors per DSM-5 guidelines.

Results: This sample was 24% female (N = 170). The proportion of people provided with a DSM-5 diagnosis of ASD was not different across sexes. (chi^2=0.001, 1 df; p=.96). The level of severity of restricted and repetitive behaviors was different across sexes (chi^2 = 12.26, 2 df; p=.002); with males showing more severe difficulties. In children under 5 sex differences failed to meet significance (chi^2=5.44, 2 df; p = .066) but were significant in children over 5 (chi^2=6.911, 2 df; p = .032). No differences were found between males and females for social communication severity ratings (chi^2 = 3.37, 2 df; p =.168); this maintained in children under and over 5.

Conclusions: In this large sample of children referred for concerns of ASD, no sex differences were found in rate of ASD diagnosis. However, males with ASD received higher severity impairment ratings in the restricted and repetitive behaviors domain; especially in older males.

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T. EILAM-STOCK. Internal and External Attention in Autism Spectrum Disorder.

Objective: The ability to attend internally is crucial for typical cognition and behavior. The goal of the present study was to investigate external and internal attention in high-functioning adults with autism spectrum disorder (ASD) and typically-developing controls (TDC).

Participants and Methods: Sixteen high-functioning adults with ASD and 15 typically-developing control (TDC) participants were recruited for the study. A novel attention task was designed, where participants were required to orient their attention externally or internally, depending on stimuli presentation (pictures or names of common objects), and answer a question about a physical property of the object. Trials were either congruent or incongruent, with or without competing external or internal information. Efficiency scores (Accuracy/RT) were calculated

and mixed-model analyses of variance (ANOVA) were performed, as well as correlation analyses with symptom severity (ADOS) and ASD traits (as measured by SRS, AQ and EQ questionnaires).
Results: The results indicated a significant main effect of Group, where participants in the ASD group had overall lower efficiency compared to the TDC group, across task conditions. A significant Group by Congruency interaction was also found, where the difference in efficiency between the congruent and incongruent conditions in the TDC group was larger than the difference between the congruent and incongruent conditions in the ASD group. Finally, significant correlations were identified between EA Conflict scores and scores on the AQ and EQ, as well as between IA conflict scores and ADOS Total scores.
Conclusions: The obtained findings suggest an alteration in cognitive processing of internal and external information in ASD. A decreased congruency effect in the ASD group may suggest a deficiency in forming rapid predictions based on past experience, which may be related to decreased ability to attend internally and incorporate past experience into expectations about, and interpretation of, the external world.
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E. FELDMAN, E. ISENSTEIN, P.M. SIPER, D. HALPERN, H. VOULGARAKIS, A. WANG, J. FOSS-FEIG & M. GORENSTEIN-HOLTZMAN. Improved Social Cognition and Job Outcomes Following an Employment-Based Social Skills Curriculum for Adults with Autism Spectrum Disorder.
Objective: Autism spectrum disorder (ASD) is associated with social and neurocognitive deficits that contribute to low employment rates in this population. Those who are employed are often poorly paid and have limited hours, and psychosocial adjustment and community integration in adults with ASD are common problems. In order to increase successful employment, we implemented an innovative social skills-based intervention that combined focus on theory of mind, emotion identification, and communication skills relevant for job acquisition and retainment. Evaluations were conducted at baseline and post-treatment to assess change.
Participants and Methods: Adults with ASD (N=23, 18-42 years) were randomly assigned to treatment and wait-list control groups. The treatment group participated in the JOBSS (Job Based Social Skills) curriculum, a manualized, 15-week, group-delivered intervention targeting the social-pragmatic skills necessary to obtain and maintain employment. Effectiveness was measured pre- and post- treatment with the Social Responsiveness Scale (SRS-2) and Reading the Mind in the Eyes Test (RMET). The treatment group also completed a six-month follow-up survey.
Results: Cognitive functioning and ASD symptoms did not differ between groups at baseline. Following treatment, compared to the control group, the JOBSS group showed significant improvement in SRS-2 Social Cognition ($F(1,17)=10.01$, $p=.006$) and Total ($F(1,17)=9.55$, $p=.007$) scores, though change on the RMET did not differ between groups. By six-months post-treatment, 36% of JOBSS participants had already increased employment.
Conclusions: The innovative JOBSS curriculum resulted in improved social cognition and increased employment in adults with ASD, offering a new approach to improving social and employment outcomes in this group. Ongoing work explores the cognitive mechanisms associated with change resulting from this intervention and tests biomarkers for stratification and treatment evaluation.
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M. GARON, B. FORGEOT D'ARC, M. LAVALLÉE, E. VERA ESTAY & M. BEAUCHAMP. Association of Visual Attention to Faces and Everyday Moral Reasoning in Autism Spectrum Disorder.
Objective: Eye tracking studies suggest that visual encoding of social cues is important for processes such as sociomoral reasoning. Alterations to the visual encoding of faces have been linked to the phenotype of autism spectrum disorders (ASD) and are associated with social and communication impairments. Yet, people with ASD often perform similarly to neurotypical participants on moral reasoning tasks, supporting the hypothesis of differential mechanisms of moral reasoning in ASD. The objective of this study was to document visual encoding and moral reasoning in ASD and neurotypical individuals using a visual, ecological, sociomoral reasoning paradigm paired with eye-tracking.
Participants and Methods: Two groups (30 ASD, 59 neurotypical) matched for age ($M = 23.33$, $SD = 5.91$) and IQ ($M = 107.70$, $SD = 9.82$) completed the SoMoral task, a set of picture situations describing everyday moral dilemmas, while their eye movements and pupil dilation were recorded using a Tobii eye tracker. Moral understanding, decision-making and justification were scored.
Results: Participants with ASD presented a longer time to first fixation on faces, $t(81) = -3.54$, $p= .001$. They also understood fewer dilemmas, $t(84) = 4.63$, $p< .001$, and produced fewer socially adaptive responses, $t(85) = 2.55$, $p= .012$. Despite a similar average level of moral maturity, the justifications produced by participants with ASD were not distributed in the same way as the neurotypical participants: they generally relied less on social and interpersonal justifications, and more on fundamental moral principles. Visual encoding was a significant predictor of moral justification for both groups, $b = 0.04$, $p< .001$.
Conclusions: The results offer some supports for the presence of alternative mechanisms underlying moral reasoning in ASD. From a clinical perspective, this study provides a better understanding of moral reasoning and could help guide the development of new interventions for individuals with ASD.
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J.M. GLENNON, H. D' SOUZA, L. MASON & M.S. C. THOMAS. Insight into the Visuo-Perceptual Correlates Underpinning Autistic Trait Variation in Neuro-Typical Children.
Objective: Ongoing debate surrounds the classification of Autism Spectrum Disorder (ASD), specifically whether it should be conceptualised as a discrete diagnostic category or as the extreme end of a normal trait distribution. Irregularities in visual attention, including disengagement difficulty and enhanced perceptual discrimination, are well-documented in idiopathic ASD populations. We assess whether these same visuo-perceptual processes underpin ASD trait variation in neuro-typical children, with implications for the validity of dimensional phenotypic perspectives.
Participants and Methods: We collected behavioural and eye-tracking data from 56 neuro-typical children, aged 3 - 9 years. Autistic trait variation was assessed using the Social Responsiveness Scale, Second Edition (SRS-2) and the Repetitive Behaviour Questionnaire, Second Edition (RBQ-2). Regression analyses were employed to examine these data in relation to attentional disengagement and visual search abilities.
Results: We find that the social and non-social features of the ASD phenotype are differentiated according to attentional disengagement and visual search performance in this neuro-typical paediatric cohort. Disengagement difficulty is linked to increased behavioural rigidity and circumscribed interest, in line with dimensional perspectives of ASD. Conversely, superior visual search performance (decreased target detection speed) is associated with a reduction in ASD trait severity, specifically in relation to the 'social awareness' sub-domain of the SRS-2.
Conclusions: We provide novel insight into the visuo-perceptual processes underpinning ASD trait variation in a sample of neuro-typical children. Our findings support a hybrid conceptualisation of ASD at the level of cognition; certain elements of the phenotype are dimensionally

distributed while others are categorically distinct. Moreover, we evidence a 'fractionated' account of ASD as the social and non-social elements of the phenotype are differentiated according to visuo-perceptual mechanism.

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H. GROSMAN, S. GUILLORY, C. MCLAUGHLIN, E. ISENSTEIN, A.A. ROUHANDEH, A. DURKIN, V. BASKETT, C. LAYTON, A. KOLEVZON, P.M. SIPER & J. FOSS-FEIG. Pupillary Light Reflex as an Objective Measure of Excitatory/Inhibitory Imbalance in Phelan–McDermid Syndrome and Autism Spectrum Disorder.

Objective: Phelan-McDermid syndrome (PMS) is a rare disorder caused by deletion or mutation of the *SHANK3* gene on chromosome 22, which plays a role in glutamatergic synaptic function. Individuals with PMS are at high risk of developing autism spectrum disorder (ASD), which is heterogeneous but also thought to involve disruption in excitatory/inhibitory (E/I) neurotransmission balance. Pupillary Light Reflex (PLR), a reflex mediated by an acetylcholine-dependent neural circuit, has been studied as a metric of the integrity of the excitatory cholinergic system (Nystrom et al., 2015). This study used eye-tracking to test PLR as a possible objective measure of E/I imbalance across PMS and ASD.

Participants and Methods: Twenty four individuals participated in the study, including 9 children and adults with ASD (M=11.1), 6 with PMS (M=13.2), and 8 typically-developing (TD) controls (M=17.4). An Eyelink 1000-Plus eye tracker was used to measure pupil response to a brief (100ms) flash of light across 16 trials. Peak pupil contraction and latency of reflex onset were the primary dependent measures.

Results: Peak pupil contraction was substantially smaller in PMS (M=-2.98, SD=.28) relative to both ASD (M=-3.11, SD=.10; Cohen's d=.65 (medium effect size (ES)) and TD (M=-3.15, SD=.12; Cohen's d=.75 (medium ES)). Likewise, mean latency was substantially longer in PMS (M=803, SD=79) relative to both ASD (M=727, SD=57; Cohen's d=1.1 (large ES) and TD (M=750, SD=62; Cohen's d=.81 (large ES)). Neither peak pupil contraction nor latency differed substantially between TD and ASD.

Conclusions: These results reinforce prior findings of excitation dysregulation in individuals with PMS and suggest PLR may be useful for quantifying E/I imbalance profiles in neurodevelopmental disorders. Because it is collected through a passive, non-invasive task, PLR is a promising potential objective biomarker for treatment trials in PMS and for biologically-driven stratification in idiopathic ASD.

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E.K. HODGES, N. SCAPINI, C. GOETZ, J. REINHOLD, C.C. PERSAD, S. NATCHA, B. GIORDANI & A.K. PRADHAN. Hazard Detection in Teen Drivers with and Without Autism Spectrum Disorder in a Simulated Drive: Preliminary Findings.

Objective: Higher-order driving skills such as anticipation and detection of roadway hazards may be more challenging for teens with autism spectrum disorder (ASD) compared to typically developing teens. Here we report preliminary findings on hazard anticipation (via eye tracking) in young drivers with ASD compared to typically developing young drivers in a driving simulator. We hypothesized that drivers with ASD would be less likely to visually search for person-related hazards compared to typically developing teens, and would not adjust their simulated drive after a hazard was observed.

Participants and Methods: ASD (n=7; mean age = 18.29 years) and typically developing teens (n = 19; mean age = 15.05 years) with learner's permits were included. Parents completed the Social Communication Questionnaire and participants were administered the Wechsler Abbreviated Scale of Intelligence-Second Edition (WASI-2). The simulator drive was programmed to include 147 hazards that were classified as object-, and person-related, as well as static versus moving. A head-mounted eye tracker was worn by the participants to measure hazard anticipation & detection during the drives. Simulator variables examined included: average velocity, standard deviation of lane offset, number of lane departures, and number of acceleration events

Results: For driving simulator variables, t-tests showed no significant differences between ASD and typically developing teens. There were significant group differences in hazard anticipation and detection, with ASD teens less likely to look at the left side of the roadway, detect person-related hazards, observe moving hazards (vehicles and pedestrians), or detect construction zones.

Conclusions: This is one of the first studies to date examining hazard detection in teens with ASD. These preliminary results show that teens with ASD, compared to typically developing teens may detect fewer hazards than their peers which could increase their risk for accidents.

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E. ISENSTEIN, C. MCLAUGHLIN, H. GROSMAN, A. DURKIN, E. FELDMAN, E. WILKINSON, J. WEISSMAN, M. ROWE, Y. ZHANG, M. MIGÓ, H. HARONY-NICOLAS, S. GUILLORY, J. BUXBAUM, A. KOLEVZON, P.M. SIPER & J. FOSS-FEIG. Differentiation of Cortical Auditory Response in Individuals with Phelan-McDermid Syndrome, Autism Spectrum Disorder, and Typical Development.

Objective: Phelan-McDermid Syndrome (PMS) is a rare disorder caused by deletion or mutation in the *SHANK3*gene at terminal chromosome 22 and confers high risk for autism spectrum disorder (ASD) and intellectual disability. Whereas idiopathic ASD (iASD) is characterized by diverse patterns of sensory differences, PMS is characterized by global hyporesponsiveness. Based on behavioral observation of these two groups, we hypothesize that cortical responses to repeated auditory stimuli will be reduced in PMS as compared to typical development (TD), and that responses in iASD will be intermediate.

Participants and Methods: EEG was recorded from 16 individuals with PMS, 11 with iASD, and 21 with TD, all 9-30 years of age, while a series of four consecutive 1000Hz tones was repeatedly presented. Within trials, each 50ms tone was separated by 616ms; inter-trial interval was 4000ms. Amplitudes of N1, P2, and N2 event-related potentials (ERP) were extracted and compared among groups.

Results: In PMS compared to TD controls, we observed a significant decrease in P2 amplitude to the first (p=.023) and second (p=.004) tones, while the third tone approached significance (p=.077). No significant differences were found between the iASD group and either the PMS or TD groups with regard to amplitude; instead, average P2 amplitude in iASD was found to be between the average TD and PMS amplitudes for all tones. N1 and N2 amplitudes did not differ among groups.

Conclusions: Our findings reveal cortical hyporesponsiveness across repeated auditory stimuli in PMS as compared to TD controls, with more modest response reductions in a heterogeneous iASD group. These results are consistent with behavioral observations in PMS and ASD and suggest an underlying neural difference in PMS that may characterize a subset of individuals with iASD. Further research in this domain may clarify the underlying etiology of sensory underreactivity in PMS and variability of sensory reactivity in ASD broadly.

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A. JULIANO, A. SPIROU, J. LENGENFELDER, N.D. CHIARAVALLOTI & E. DOBRYAKOVA. Resting State Functional Connectivity Patterns of Intelligence in Pediatric Autism Spectrum Disorder.

Objective: Intellectual impairment occurs in approximately 33% of children with ASD. While previous studies have examined the impact of higher intelligence (IQ) on functional outcomes in children with ASD, little is known about how intrinsic functional connectivity (FC) patterns relate to IQ in this population. This study examined FC patterns in children with ASD across dimensions of intellectual functioning.

Participants and Methods: Subjects included 45 male children with ASDs from ABIDE I/II databases. All subjects completed their rs-fMRI scans with a Siemens scanner that used a TR=2. Three equal groups (n = 15) were formed to investigate correspondence between IQ and FC patterns. These groups included Low (72.87 ± 9.38), Avg (101.67 ± 1.59), and Superior (138.27 ± 7.22) IQ. Groups were matched on age (11.59 ± 2.82), motion (mFD = 0.04 ± 0.02), and symptom severity (SRS = 86.42 ± 27.59). The group ICA was completed using FSL's MELODIC. Dual regression was used to map the group-ICA results back into each individual's data, followed by 5000 permutations to correct for multiple comparisons.

Results: FC patterns increased in regions of the Salience (Avg > Low), Cerebellar (Sup > Low) and bilateral Frontoparietal (FPN; Avg > Low) networks as IQ increased. The left FPN also exhibited greater FC in the Low > Avg and Avg > Sup contrasts.

Conclusions: Previous work has shown increased FC within medial and left frontal cortices and bilateral parietal cortices with increasing IQ. In the current study's sample, this was only supported in the Low vs. Average group contrast, suggesting that having ASD may alter expected IQ contributions to FC patterns. Further, the left MFG may have a unique relationship with IQ in ASD given varied FC patterns. Although this study had a relatively small sample size and no control group, the findings suggest that FC patterns of IQ might not follow expected patterns when involving pediatric ASD samples. Future studies should compare changes in FC in relation to IQ across pediatric ASD and healthy controls.

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T. MAYNARD, G. BLOCK, A. JANNATI, A. PASCUAL-LEONE & M. O'CONNOR. Personality Assessment in Autism: Are There Clinically Relevant Subtypes?

Objective: Requisite criteria for diagnosis of Autism Spectrum Disorder (ASD) include problems with interpersonal relationships and restricted interests (DSM-5; APA, 2013). Despite these vulnerabilities, few studies employ standard measures to assess personality functions of people with ASD. In this study we use the Personality Assessment Inventory (PAI; Morey, 1991) to characterize a group of ASD adults. In addition, we examine the relationship between face memory deficits (FMD), emotional perception and personality functions in this group.

Participants and Methods: ASD participants were referred to the Cognitive Neurology Unit. All met DSM-5 criteria for ASD. Neurotypical (NT) controls served as a comparison group. 55 ASD's (12 female, 43 male) and 22 NTs (all male) were enrolled. Participants' intelligence levels did not significantly differ (z = 1.19, p = 0.23). The PAI was administered to quantify personality subtypes. The Warrington Recognition Memory Test (Warrington, 1984) was used to determine FMD. The Eyes Test (Baron-Cohen et al., 2001) provided information regarding emotion perception.

Results: ASD and NT groups demonstrated significant differences on multiple PAI scales. Among ASD's, FMD was associated with elevations on PIM and RXR (p's < .01) and lower scores on ANX, DEP, SCZ, BOR, and STR (p's < .05). NTs with and without FMD differed on only one PAI scale: RXR (p = .02). In both groups FMD was associated with low scores on the Eyes Test (p = .04).

Conclusions: As expected, people with ASD scored differently from NTs on the PAI. ASD's with FMD emphasized positive traits and downplayed depression, anxiety, and social isolation. Prior investigations have shown an association between FMD, anosognosia, and right hemisphere dysfunction (Gainotti, 2011; 2017; Warrington, 1984). In this context there may be a right hemisphere ASD phenotype presenting with FMD, poor emotional perception and lack of insight.

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C. MCLAUGHLIN, S. GUILLORY, M. AMEZCUA, E. ISENSTEIN, H. GROSMAN, I. FALADE, A.A. ROUHANDEH & J. FOSS-FEIG. EEG Markers of Attention to Auditory and Visual Stimuli in Autism Spectrum Disorder.

Objective: Autism Spectrum Disorder (ASD) is commonly characterized by sensory abnormalities; many individuals with ASD display hyper- or hyposensitivity to specific sensory stimuli. It remains unclear, however, if attention to sensory stimuli differs between ASD and typically developing (TD) individuals. Our aim was to quantify differences in neural markers of attention to visual and auditory stimuli between ASD and TD.

Participants and Methods: EEG was recorded from participants with ASD (age 11-27) and TD (age 19-30) during visual and auditory oddball tasks (VOD and AOD). Each task consisted of three blocks of 150 trials in pseudorandom order; 80% of trials presented a "standard" stimulus (VOD: small blue circle; AOD: 500Hz tone), 10% presented a "target" stimulus (VOD: large blue circle; AOD: 1000Hz tone), and 10% presented a "novel" stimulus (VOD: fractal image; AOD: animal noises, bells). Participants responded with a button press to target stimuli only. Amplitudes of P3a (novel) and P3b (target) event-related potentials were assessed.

Results: During the VOD task, ASD (9.75μV) and TD (10.25μV) displayed similar P3a amplitude to novel stimuli (Cohen's d=.17), but ASD had substantially enhanced P3b response to target stimuli (ASD: 12.48μV; TD: 9.12μV; Cohen's d=.87). During the AOD task, ASD and TD individuals did not differ in either P3a amplitude to novel stimuli (ASD: 5.65μV; TD: 5.89μV; Cohen's d=.09) or P3b amplitude to target stimuli (ASD: 4.71μV; TD: 4.58μV; Cohen's d=.05). Behavioral performance of target detection did not differ between groups.

Conclusions: Our findings identify a large between-group effect size only in visual P3b, suggesting individuals with ASD attend more strongly to visual target stimuli than TD individuals. This result indicates a difference in how ASD individuals allocate attentional resources in response to visual but not auditory, and target but not novel, stimuli. It is consistent with enhanced perceptual functioning in ASD in the visual domain.

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L.E. MILLER, J.D. BURKE, D.L. ROBINS & D.A. FEIN. Diagnosing Autism Spectrum Disorder in Children with Low Mental Age.

Objective: Diagnostic tools for Autism Spectrum Disorder (ASD) are not designed for use in mental ages (MA) below 12 months. The Autism Diagnostic Observation Schedule (ADOS) and the Childhood Autism Rating Scale (CARS) were examined in children with low MA to determine diagnostic utility, compared to clinical judgment, in discriminating ASD from Global Developmental Delay (GDD). Individual symptoms differentiating ASD-low MA, GDD, and ASD-higher MA were also explored.

Participants and Methods: Participants were toddlers with ASD-low MA (n = 53), GDD (n = 175), or ASD-higher MA (n = 425). ADOS and CARS classifications (i.e., ASD vs. non-ASD) were compared to clinical diagnosis using Fisher's exact tests and binary logistic regression.

Symptom profiles, based on individual ADOS items, were explored using repeated-measures ANOVA with a between-subjects factor of diagnostic group and a within-subjects factor of ADOS item scores.
Results: The ADOS and CARS demonstrated similar agreement with clinical best estimate, yet in cases of disagreement, the ADOS over-classified ASD in low MA, but the CARS both over- and under-classified. All ADOS items differentiated GDD participants from those in both ASD groups. Elementary social behaviors (e.g., eye contact, social interest) were similar between ASD-low MA and ASD-higher MA, but advanced social skills (e.g., pointing, pretend play) were more impaired in ASD-low MA. Participants with GDD also displayed mild deficits in these advanced social behaviors. Children with ASD-low MA were more severe than those with ASD-higher MA on most ASD symptoms.
Conclusions: Clinicians should exercise caution in selecting diagnostic tools for individuals with low MA and consider the relative benefits of over- versus under-classification. ASD-low MA, a particularly severe presentation, may require a modified ADOS algorithm (e.g., emphasizing elementary social skills instead of more advanced behaviors) to account for developmental delays.
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S. RAU, S. SHAKIN, A. GROSSE, A. ARMOUR, K. CSUMITTA & L. KENWORTHY. Tools to evaluate ADHD symptoms in Autism Spectrum Disorder.
Objective: Research shows performance based measures of attention and executive functioning (EF) have limited clinical utility beyond parent report measures to inform attention-deficit/hyperactivity disorder (ADHD) diagnosis outside the context of autism spectrum disorder (ASD). Studies have shown commonly used rating scales may have less utility in capturing ADHD in ASD. There is little research on whether data from performance based measures inform ADHD diagnosis in ASD, an important question given the removal of the exclusivity clause for these diagnoses in DSM-5. We examined which combination of attention and EF parent questionnaires and neuropsychological tests best predicted ADHD in ASD without intellectual disability (ID).
Participants and Methods: Participants were individuals with ASD without ID (N=225, age 5-16, mean FSIQ=99). We compared 3 groups: ASD only (N=62), ASD+ADHD-Combined presentation (N=132), and ASD+ADHD-Inattentive presentation (N=31). Receiver operating curve(ROC) analyses (examination of area under the curve[AUC]) and hierarchical logistic regression were used to identify measures' diagnostic discriminability and clinical utility, which included the ADHD Rating Scale, BRIEF Inhibition and Working Memory scales, Digit Span forward/backward, and select scales from the Test of Everyday Attention for Children and Tower of London(TOL).
Results: Only the parent report measures and several scales from the TOL were clinically meaningful or approaching adequate levels of diagnostic discriminability to identify comorbid ADHD (AUCs ranging from .61-.87). Further analysis indicated that the TOL Total Correct and Initiation time scores did not provide additional clinical utility above and beyond parent report measures.
Conclusions: Our findings replicate those from previous studies, in a sample with ASD, which identified parent report measures to be to be most informative in predicting ADHD. This finding is valuable as co-occurring ADHD can be diagnosed in ASD, and there is limited literature guiding how to do so.
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P.M. SIPER & M. ROWE. The Sensory Assessment for Neurodevelopmental Disorders in Children with Idiopathic and Syndromic Autism Spectrum Disorder with Intellectual Disability.
Objective: The Sensory Assessment for Neurodevelopmental Disorders (SAND) is a clinician-administered observation and corresponding caregiver interview that captures sensory hyperreactivity, hyporeactivity, and seeking behaviors across visual, tactile, and auditory domains and is appropriate for severely affected populations. This study used the SAND to quantify sensory reactivity in children with three of the most common single-gene causes of ASD and intellectual disability (ID).
Participants and Methods: The SAND was completed on 40 individuals with Phelan-McDermid syndrome (*Mage*=7.80), 6 individuals with ADNP syndrome (*Mage*=7.28) and 5 individuals with FOXP1 syndrome (*Mage*=8.28) and compared 91 age-matched individuals with iASD and 43 age-matched controls. The SAND includes a semi-structured observation and corresponding caregiver interview.
Results: Results indicated significantly greater sensory symptoms compared to controls (*M* total score=7.857) in both idiopathic (*M*=28.02) and syndromic ASD (sASD) groups with similar levels of overall symptoms reported in PMS (*M* = 26.55), ADNP syndrome (*M*=33), and FOXP1 syndrome (*M=27.60)*. The PMS group displayed significantly higher scores in the hyporeactivity domain compared to all other groups ($p<.01$). The ADNP group displayed significantly greater sensory seeking compared to all other groups ($p<.01$). Individuals with FOXP1 displayed greater seeking as compared to hyperreactivty and hyporeactivity. Both the ADNP and FOXP1 groups showed similar levels of hyperreactivity and hyporeactivity relative to the iASD group.
Conclusions: Findings suggest syndrome-specific sensory profiles characterized by predominant hyporeactivity in PMS, sensory seeking in ADNP syndrome and significant overlap between the FOXP1 and iASD groups across domains. Results have important implications for treatment recommendations and may be represent novel targets for treatment in the context of clinical trials.
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T. SORENSON, R. SCHEUB, A. KIRK & M.S. HELT. The Role of Empathy and Eye Gaze in Contagious Yawning and Itching.
Objective: Contagious yawning is observed more frequently in individuals with high levels of empathy, and less frequently in individuals with Autism Spectrum Disorder (ASD) or high levels of psychopathic traits. The present study explores the extent to which susceptibility to contagious yawning (signaled from the face) and itching (signaled from the hand) may be differentially mediated by eye contact in individuals with high levels of psychopathic traits, high levels of ASD traits, and low levels of both, in a non-clinical population of students at Trinity College.
Participants and Methods: Fifty-six participants, ages 18-22, were presented stimuli of individuals yawning or itching on a desktop eye tracking system. Participants' eye movements were percentage of time fixated on the eyes of the people in the stimuli videos. Participants were administered the Interpersonal Reactivity Index (IRI) (a multidimsensional assessment of empathy), the Autism Spectrum Quotient (AQ) and The Psychopathy Personality Inventory Revised (PPI-R), and the Adult Sensory Processing Disorder Checklist (ASPDC).
Results: Individuals with high ASD traits and high psychopathic traits showed reduced contagious yawning compared to the low trait group. However, the tendency to contagiously yawn was mediated by eye contact to the target in the group with high ASD traits, but not in the group with high psychopathic traits. Those with high psychopathic traits also showed reduced levels of contagious itching whereas individuals high in ASD traits showed increased contagious itching. Psychopathic traits were inversely correlated with susceptibility to both yawn and itch. Empathy levels were also significantly correlated with contagious yawning, whereas endorsement of sensory issues was significantly correlated with contagious itching.

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Conclusions: The authors discuss these findings in terms of their implications for unique empathy profiles between psychopathy and ASD.
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A. VILLANIS, A. JULIANO, A. HAIGHT, L. HENDRIX, A.O. ALEXANDER, J. DELUCA & H. GENOVA. Reductions in Parental Stress and Burnout Following Mindfulness Training for Children with ASD.

Objective: Parents and caregivers of children with Autism Spectrum Disorder (ASD) experience a significant amount of stress and burnout. While there have been studies examining how mindfulness treatments given to caregivers may improve stress, no studies to our knowledge have examined how mindfulness training for children with ASD may affect caregivers' stress levels. This study examined whether parental stress and burnout decreased following a school-based, mindfulness training program (SBMTP) given to children with ASD.
Participants and Methods: Participants consisted of 24 parents (91.7 % female) whose children with ASD completed an eight-week SBMTP. Parents completed pre-post testing using the following self-report measures: a modified version of the Maslach Burnout Inventory (MBI: assesses parental burnout); the Response to Stress Questionnaire: Family Stress subscale (RSQ-FS; assesses perceived family stress), and a modified Perceived Stress Scale (PSS; assesses generalized aspects of stress).
Results: Following the SBMTP, parents reported a decrease in family-based stress ($t(23) = 3.965$, $p = 0.001$, $d = 0.81$), overall stress levels ($t(23) = 3.748$, $p = 0.001$, $d = 0.77$), and burnout (specifically, emotional exhaustion; $t(23) = 3.503$, $p = 0.002$, $d = 0.71$).
Conclusions: Previous research has shown that parents of children with ASD who engage in mindfulness training experience a reduction in their stress levels. The current study appears to be the first to examine how a SBMTP for children with ASD can reduce burnout and stress levels of their parents. Limitations of this study include having a small sample size and no control group. Given the medium to large effect sizes, these results suggest that the mindfulness training for children with ASD holds promise as a short-term intervention that can benefit the entire family system.
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J. WEISSMAN, H. GROSMAN, K. MEYERING, D. HALPERN, J. ZWEIFACH, H. VOULGARAKIS, E. ISENSTEIN, A. DURKIN, J. FOSS-FEIG & P.M. SIPER. Cognitive Functioning in Individuals with ASD and Their Unaffected Sisters.

Objective: Autism spectrum disorder (ASD) is a heterogeneous neurodevelopmental disorder four times more prevalent in males. The Autism Sisters Project seeks to identify a female protective effect by examining both genetic and phenotypic factors such as IQ. The current study examines the relationship between cognitive functioning in individuals with ASD and their unaffected sisters. We also examined the reliability of abbreviated cognitive testing in children with ASD.
Participants and Methods: Cognitive testing was completed on 13 individuals with ASD (ages 6-24) and their unaffected sisters (ages 6-27). Participants were recruited through the Autism Sisters Project. The Wechsler Abbreviated Scale of Intelligence, 2nd Edition (WASI-II) was administered to all participants. Probands were also administered the Wechsler Intelligence Scale for Children, 5th Edition (WISC-5) or the Wechsler Adult Intelligence Scale, 4th Edition (WAIS-4).
Results: Probands scored significantly lower on the WASI-II relative to their siblings without ASD (p=.025). Mean WASI-II composite score was 94.14 (SD=25.73; range = 46=129) in the ASD group and 114.85 (SD=8.79; range = 98-130) in the sisters group. Within families, sisters scored, on average, 23 points higher than their siblings with ASD. In the ASD group, WISC-5 scores were strongly correlated with WASI-II scores (r=.974, $p<.001$) and reliability between measures for FSIQ was high (a = .975).
Conclusions: Female siblings of individuals with ASD scored approximately 1.5 standard deviations higher than their siblings with ASD. In addition, the WASI-II appears to be a reliable measure of IQ in children with ASD and may represent a preferred measure to maximize data collection in large research studies.
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E. WILKINSON, M. ZIMIC, R. GILMAN, F. BARRIENTOS PORRAS, M. ROWE, J. FOSS-FEIG, A. KOLEVZON & M. TRELLES. Validation of a Tablet-Based Eye Tracker for Assessment of Social Attention in Autism Spectrum Disorder.

Objective: Autism spectrum disorder (ASD), a complex neurodevelopmental disorder, is characterized by deficits in social interaction. One way of investigating these deficits is through eye-tracking technology, which has often shown reduced visual attention to social stimuli. However, this technology utilizes large, expensive devices and does not tolerate head movement, which is often a confound with many children with ASD. The current study aims to address this limitation by using an easy to administer, short paradigm with a portable tablet device.
Participants and Methods: Eye-tracking was completed on 9 children (ages 4-10) with ASD and 9 typically developing children (ages 4-10). All participants were also administered a cognitive assessment to derive verbal, nonverbal, and full scale IQ scores, and ASD diagnoses were confirmed with gold-standard assessments. The task consisted of a 60 second video where a social scene and a non-social scene were displayed side-by-side. The tablet recorded eye movements, which were analyzed by an automated algorithm to determine percent looking time to social and non-social images and percent time distracted.
Results: Children with ASD (M= 19.15, SD=11.82) spent a lower percentage of time looking at the social scene than TD controls (M=33.29, SD=15) ($p<0.05$). There was no significant difference in percent time looking at the non-social scene for ASD (M=20.94, SD=15.6) versus TD (M=13.81, SD=12) ($p=.29$) or in percentage time distracted (ASD: M=59.87, SD=18.86; TD: M=52.88, SD=21.94; $p=.48$).
Conclusions: Although preliminary, these results indicate a statistically significant difference in gaze preference, such that ASD individuals had decreased preference to the social scene. This replicates, using a tablet device, what has been found in studies requiring much more expensive and cumbersome technologies. Additionally, the task was easy to administer and low burden for participants. Results from this study support larger-scale validation of this technology in a wide range of settings.
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J. ZWEIFACH, D. HALPERN, J. FOSS-FEIG, M. GORENSTEIN-HOLTZMAN, S. LURIE, J. WEISSMAN, E. FELDMAN, M. ROWE, E. WILKINSON, A. DURKIN, J. BUXBAUM, A. KOLEVZON & P.M. SIPER. Cognitive and adaptive profiles in Phelan-McDermid syndrome and idiopathic autism spectrum disorder with intellectual disability.

Objective: Phelan-McDermid syndrome (PMS) is one of the more common single gene causes of autism spectrum disorder (ASD) and accounts for up to 2% of individuals with intellectual disability (ID). The current study compares cognitive and adaptive profiles in PMS relative to individuals with idiopathic ASD (iASD) and comorbid ID.
Participants and Methods: Participants included 10 children with PMS (ages 3-17) and 12 age-matched children with iASD and ID. Individuals in both groups had full scale IQs below 70. Participants were selected based on their ability to complete standardized IQ testing as measured by the Stanford Binet Intelligence Scales, Fifth Edition, Wechsler Intelligence Scales for Children, Fifth Edition, or Differential

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Ability Scales, Second Edition. Those unable to complete age-appropriate IQ tests were not considered for analyses. Adaptive functioning was measured using the Vineland Adaptive Behavior Scales, 2nd Edition.
Results: There were no significant differences between PMS and iASD groups on verbal IQ (VIQ; p=.77), nonverbal IQ (NVIQ; p=.82), or full scale IQ (FSIQ; p=.23). VIQ and NVIQ were similarly developed in both groups (p=.20). FSIQ ranged from 40-65 in the PMS group (M=48, SD=9.27) and 40-66 in the iASD group (M=54 SD=9.63). Results from the Vineland-II indicated no significant differences on the Adaptive Behavior Composite (p=.63) or within individual domains. Standard scores on the Socialization domain represented a strength of the PMS group (M=74; SD=13.02) relative to the iASD group (M=65; SD=12.72).
Conclusions: Our findings suggest similar cognitive and adaptive profiles in children with PMS and mild-to-moderate ID compared to children with iASD and mild-to-moderate ID. Verbal and nonverbal abilities were equally developed in both groups, which diverges from previous reports of higher NVIQ vs. VIQ in individuals with ASD. Future studies will include larger samples and will examine individuals with severe-to-profound ID.
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Career Development/Education/Training

D. BRITO-NAVARRETE & F. OSTROSKY. Effects of maternal parenting behaviors on the development of executive functions in preschool children.
Objective: The purpose of the present study was to assess the effects of the Programa de Entrenamiento Materno Infantil: Enfoque Neuropsicológico (PREMIEN) in maternal parenting style behaviors and its impact on the development of executive functions in preschool children.
Participants and Methods: A descriptive, prospective, correlational study was conducted using a convenience sample that included 40 dyads of mothers and their children between 3 and 6 years old. The control group included 43 children whose mothers did not attend the PREMIEN intervention was paired to the PREMIEN sample to compare results at post test assessment. The PREMIEN program provides strategies to the mothers so as to promote physical, cognitive and emotional development of their children. A pre and post assessment of children's perception of parental style of his mother and the development of executive functions was performed.
Results: Correlation shown positive relation between EF total score. There were changes in perception of parenting style of the children of the experimental group in pre and post-test meassures, and there were diferences between the experimental and the control group at the post test. There was also an increase in their scores on tasks of executive functions at post test and compared to a control group.
Conclusions: Results showed that PREMIEN program might have an influence on children's cognitive development, specifically in working memory and flexibility functions and in children's perceived parenting style likely attributable to mothers' change in parenting behaviors. The democratic parenting style perceived by preschool-age children improves performance in work memory task. Educational interventions that provide mothers with strategies and knowledge regarding the cognitive and emotional development of their preschool children, have an impact.
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S. CASTRO, M. MARTINS, L. NEVES, P. RODRIGUES & O. VASCONCELOS. Music vs. Sports Training: Impact on Children's Fine Motor Abilities.
Objective: The possibility of near and far transfer effects of music training in childhood has been typically examined in studies involving middle-class children who learned how to play an instrument in individual lessons. Here our goal was to investigate the impact of less resource-demanding music training programs—collective Orff-type music instruction —on fine motor abilities of elementary school children from low-income communities. We conducted a longitudinal training study consisting of pre-test, training for 24 weeks, post-test and follow-up four months later at the start of the following school year, and compared the effects of music training with that of sports/basketball training or no training, respectivelly the target, active control and passive control groups.
Participants and Methods: Participants were 74 children (40 girls; M age 8.31 years, SD 0.35) attending the 3rd grade in public elementary schools from low-income communities. They were pseudorandomly distributed into three groups matched on demographic and intellectual characteristics, the music (n = 25), sports (n= 25) and control (n = 24) groups. Fine motor abilities were assessed with the Purdue pegboard (manual dexterity and bimanual coordination) and the Grooved pegboard (manipulative dexterity) tests.
Results: Music-trained children significantly outperformed those from the sports and control groups on bimanual coordination and manual dexterity at post-test, and this advantage was stable at follow-up. Remarkably, at follow-up none of the children from the music group were performing at the lower end (< 20th percentile), while that happened in the other groups. Manipulative dexterity improved in all groups from pre-test to follow-up, and was not affected by type of training.
Conclusions: Collective Orff-like music training was more effective than sports/basketball training in enhancing children's bimanual coordination and manual dexterity, but neither training affected manipulative dexterity, both reflecting a possible instance of near transfer.
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Cognitive Intervention/Rehabilitation

R. MAJA, N. MOTAMED-YEGANEH, R. DENYER, L. CHIU, L. BOYD & R. WEBER. Cognitive Outcomes of the Arrowsmith Program.
Objectives: Interest is growing regarding the effectiveness of cognitive interventions in children with learning difficulties (Camilli, Vargas, Ryan, & Barnett, 2010). The Arrowsmith Program is a year-long program that targets a broad spectrum of cognitive abilities (Arrowsmith-Young, 2018). The purpose of the current study is to examine the cognitive outcomes associated with participation in this program.
Methods: A total of 36 children and youth (24 treatment) participated in data collection at two time points, which included neuroimaging and the *Woodcock Johnson Test of Cognitive Abilities-Third Edition* (WJ-III COG). Only the Arrowsmith participants were included in the repeated measures analyses. Arrowsmith students were grouped for neuroimaging analyses based on cognitive growth.
Results: A significant multivariate time effect was found, indicating overall cognitive improvement (Wilk's λ = .08, F (11, 12) = 13.19, p < .001, h_p^2 = .92). Follow-up univariate effects emerged for long-term and working memory, fluid reasoning, processing speed, vigilance, and verbal fluency. Whole brain myelin water fraction (MWF) values at baseline predicted cognitive growth (F (1, 23) = 5.40, p < 0.05). Follow-up region of interest (ROI) analyses indicated that greater baseline MWF values in right hemisphere corona radiata (CR), superior longitudinal fasciculus (SLF), and cingulum (CG) predicted growth in processing speed, while greater baseline MWF values in a broader

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network of right and left hemisphere CR, SLF, and superior fronto-orbital fasciculi (SFOF) predicted growth in vigilance.
Conclusions: The Arrowsmith program participants demonstrated significant growth across multiple cognitive domains. In addition, those with more cognitive response showed greater myelination at baseline. MWF may be a biomarker that could predict cognitive intervention response. Future analyses should include normative comparisons regarding cognitive growth.
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S. MARTIN, R. DENYER, R. PADDACK, S. LISAINGO, L. BOYD & R. WEBER. Emotional and Behavioral Outcomes of the Arrowsmith Program.
Objective: Little is known about the potential emotional and behavioural outcomes of cognitive training programs. While these difficulties are not the focus of such programs, the individualized support and sense of community fostered by the Arrowsmith program may improve emotional and behavioral functioning. This presentation will focus on the emotional and behavioural outcomes of students that have participated in the Arrowsmith cognitive training program.
Participants and Methods: A total of 28 students and their caregivers (22 treatment and 6 controls) participated in data collection at both timepoints. At each timepoint, a caregiver completed ratings on the *Behavioral Assessment System for Children, Second Edition* (BASC-2). Only Arrowsmith students were included in the repeated measures analyses and these students were also grouped based on emotional and behavioral improvements.
Results: No multivariate effects were identified in terms of internalizing, externalizing, or adaptive behaviors. Univariate effects emerged in the areas of attention (F (1, 19) = 5.62, $p < .05$, $h_p^2 = .23$) and activities of daily living (F (1, 21) = 5.10, $p < .05$, $h_p^2 = .12$). A repeated-measures ANOVA yielded a significant within-subject effect of time on whole brain myelin water fraction (MWF) values (F (1, 18) = 4.98, $p < .05$). The Arrowsmith students showing improvement in attention did not show significantly different patterns of MWF change nor did they differ in whole brain or region of interest MWF values at baseline.
Conclusions: The present study suggests that participation in the Arrowsmith program is related to some changes in behavioural functioning. All students increased in terms of whole brain MWF values, yet mylein plasticity did not differ in children demonstrating greater behavioral improvement. Future studies with larger sample sizes are needed to confirm the impact of cognitive training programs on the emotional, and behavioural functioning of students.
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M. MURPHY, R. DENYER, V. NGUY, L. BOYD & R. WEBER. Academic Outcomes of the Arrowsmith Program.
Objective: Studies of cognitive intervention for students with learning disabilities (LD) generally show results of "near transfer", or improvements in the targeted cognitive abilities, but evidence of "far transfer" is rare (Melby-Lervåg, Redick, & Hulme, 2016). Most research has considered programs targeting working memory only, with no programs as comprehensive as the Arrowsmith program. The purpose of this presentation is to examine the academic outcomes associated with the Arrowsmith program.
Methods: A total of 37 children and youth (28 treatment) completed the *Woodcock Johnson Tests of Academic Achievement, Third Edition, Normative Update* (WJ-III NU) and neuroimaging at two time points. Due to the small number of control participants, only the Arrowsmith group was included in the repeated measures analysis. Arrowsmith students were grouped for neuroimaging analyses based on academic growth.
Results: A repeated-measures MANOVA yielded a significant within-subject effect of time academic areas (Wilk's l = .30, F (6, 22) = 8.57, $p < .001$, $h_p^2 = .70$). Univariate effects were found for single word reading, pseudoword decoding, reading fluency, calculation and math fluency. A repeated-measures ANOVA yielded a significant within-subject effect of time on whole brain myelin water fraction (MWF) values (F (1, 24) = 6.73, $p < .05$). Arrowsmith students demonstrating greater academic growth did not show significantly different patterns of MWF change or baseline differences in whole brain or region of interest MWF.
Conclusions: Our data suggest that the Arrowsmith participants gained academic skills. Similarly, all children increased in terms of whole brain MWF yet neither structural brain plasticity nor MWF was related to measures of academic gains. Future analyses will involve additional normative comparisons to determine whether the growth in Arrowsmith students' academic skill is greater than what would be expected in a normative population.
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R. WEBER, R. MAJA, N. MOTAMED-YEGANEH, R. DENYER, L. CHIU, L. BOYD, M. MURPHY, V. NGUY, R. PADDACK & S. LISAINGO. Neurocognitive and Behavioral Outcomes of the Arrowsmith Program.
Interest in cognitive intervention and its effectiveness in improving children's learning has been growing for some time (Camilli, Vargas, Ryan, & Barnett, 2010). Most interventions to date have been developed with fairly narrow cognitive targets, such as working memory, making the Arrowsmith program unique, with its broad array of cognitive targets and individualized approach based on identified student weaknesses. This program attempts to improve areas of cognitive weakness in children and youth with learning disabilities as a means to improve their learning capacity. The purpose of this symposium is to present longitudinal findings for a cohort of Arrowsmith program participants. It will consist of four presentations, which address the cognitive, executive functioning, academic, and behavioral improvements observed in these Arrowsmith students. First, Rachel Maja and colleagues will present on the cognitive outcomes of this program, presenting WJ-III COG and neuroimaging data demonstrating overall cognitive improvements and myelin water fraction (MWF) correlations. Next, Dr. Rachel Weber (myself) and colleagues will discuss the executive functioning (EF) outcomes of this program, which focus primarily on visual working memory, with no significant findings on caregiver ratings of EF (on the BRIEF). Third, Meagan Murphy and colleagues will present on the academic findings, or evidence of far transfer, in this sample, which were significant, but not correlated with MWF values, though all Arrowsmith paricipants did improve in terms of whole brain MWF. Finally, Stephanie Martin and colleagues will present on the behavioral outcomes associated with participation, most notably in attention and adaptive functioning. These results will be discussed in terms of their implications for future research and use of the Arrowsmith program. Our discussant, Dr. James Hale, will also contribute to these discussions from the field of educational neuroscience.
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R. WEBER, S. MARTIN, M. MURPHY, L. CHIU & L. BOYD. Executive Functioning Outcomes of the Arrowsmith Program.
Objective: Students with learning disabilities (LD) often demonstrate difficulty in one or more areas of executive functioning (EF; Meltzer, 2018). Given the long-term outcomes associated with improved EF, and the responsiveness of EFs training, these skills are ideal targets for intervention with students with LD (Diamond, 2013; St Clair-Thompson & Gathercole, 2006). While EF is not a direct cognitive target of the Arrowsmith program, there is reason to expect that this program's effects may extend to EFs, evidencing some transfer effects. This presentation will focus on the EF outcomes observed in Arrowsmith students.

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Methods: A total of 22 children and youth (17 treatment and 5 control) completed behavioral measures of EF at both time points. The behavioral measures included tasks from the NIH Toolbox and the Automated Working Memory Assessment (AWMA). An additional 4 Arrowsmith students and 7 control participants completed the Behavior Rating Inventory of Executive Function (BRIEF) at each time point. Only the Arrowsmith group was included in the repeated measures analysis of the behavioral measures. The BRIEF data were analyzed including all collected data.
Results: The Arrowsmith participants demonstrated a significant improvement in their performance on the Spatial Recall task of the AWMA (F (1, 16) = 5.63, $p < .05$, $h_p^2 = .26$), which measures visual working memory. No significant time, group, or time x group interactions were found for the BRIEF data.
Conclusions: Participation in the Arrowsmith cognitive intervention program is associated with growth in at least one aspect of EF – visual working memory. There is currently no evidence that this improvement yielded subsequent improvements in daily EF, but more research is needed with larger sample sizes and normative comparisons to confirm this.
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Drug/Toxin-Related Disorders (including Alcoholism)

J.C. DUPERROUZEL, S.W. HAWES, I. PACHECO-COLÓN, K. GRANJA & R. GONZALEZ. No Evidence for Additive Adverse Effects of Alcohol and Cannabis Use on Memory Performance During Adolescence.

Objective: Deficits in learning and memory are among the most common effects of recent alcohol and cannabis use (CU) exposure. However, the adverse effects of parallel use during adolescence is in need of further study. We explored whether verbal and visual memory performance differed between nonusers, alcohol-only, cannabis-only, and alcohol and cannabis using teens. Due to neurotoxic effects of adolescent substance use on hippocampal development, we hypothesized that users of both alcohol and cannabis would display poorer memory performance relative to other groups.
Participants and Methods: Participants were 285 adolescents (ages 14-17) grouped based on drug use history and past month drug use as nonusers (n=115), alcohol-only (n=37), cannabis-only (n=71), and both alcohol and cannabis (ALC+CU; n=62) users. We measured past month drug use via self-report, and memory performance via the California Verbal Learning Test, 2nd Edition (CVLT-2) and Wechsler Memory Scale, 4th Edition (WMS). We conducted ANCOVAs with various indices from the CVLT-2 and WMS as outcome variables.
Results: We found a significant effect of group on the WMS Long-Delay Index (p= .03) after controlling for sex and age. Post-hoc analyses revealed that, despite CU being marginally higher in the ALC+CU relative to the cannabis-only group (p = .06), the cannabis-only group had marginally poorer delayed memory performance compared to nonusers (p= .06). No other group differences emerged (ps> .05).
Conclusions: Our results, in part, replicate prior findings that suggest adolescent CU is associated with deficits in delayed memory. Surprisingly, the ALC+CU group did not show worse memory performance. Future work should further examine potential factors that may explain better performance among co-users (e.g., tolerance, metabolic interactions, neuroprotective factors) and delineate the independent and interactive effects of poly-substance use on other cognitive functions.
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Infectious Disease/Encephalitis/Meningitis (including HIV/AIDS)

D. KOLCZ & K.P. YOUNG. A Case Study Demonstrating the Utility of Neuropsychological Assessment in Monitoring Treatment Response in Pediatric Autoimmune Encephalitis.

Objective: Early recognition of autoimmune encephalitis (AE) is critical as early treatment is associated with improved outcome. However, diagnosis and management of AE remains challenging; symptoms are often misconstrued as psychiatric. Only a handful of pathologic antineuronal antibodies have been discovered, and clinician confusion about best practices inhibits prompt initiation of immunotherapy. While neuropsychological (NP) assessment often reveals gross impairment in the acute stage and cannot differentiate between antibodies, it is a viable tool for tracking cognitive functioning in individuals with presumed AE and monitoring their response to treatment. Using NP assessment to track treatment during the acute phase of AE is novel but can be a critical component to recovery.
Participants and Methods: We present a case of a 14-year-old female with AE of unknown etiology. Her clinical presentation was tracked across multiple medical and psychiatric admissions as well as during outpatient treatment and serial NP evaluations over two years. Record review, including clinical notes, lab tests, and imaging results are supplemented with her performance on serial inpatient and outpatient NP evaluations.
Results: Data from serial bedside Montreal Cognitive Assessments, four lengthier inpatient screens, and two outpatient evaluations are presented. Inpatient data showed a strong correlation between cognitive status and immunotherapy schedule. Incomplete but improved symptom remission tracked over 25 months demonstrated significant cognitive and clinical improvement despite residual impairment in attention and ongoing but tolerable psychotic symptoms.
Conclusions: NP assessment, tailored to clinical situation, can be used to aid in the differential diagnosis and treatment management of pediatric patients with suspected AE.
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Learning Disabilities/Academic Skills

C.C. AJAELU. Linking dyslexia to brain activities: A perspective in neuro-clinical linguistics.

Objective: *Dyslexia, a neurodevelopmental learning disability, has received a greater attention in developed nations, than in developing ones, like Nigeria. This lacuna is diminishing not only quality education, but also individual potentials to contribute meaningfully to nation's development. With the assumption that dyslexia is caused by phonological deficits unsubstantiated, evidences linking dyslexia to brain activities, especially the visual spatial attentional factors, genetic marker and dorsal visual stream, have renewed in the dynamism of dyslexia: how it can be evaluated, diagnosed and effectively treated*
Participants and Methods: 300 school children (from Junior and Senior Secondary) with identifiable dyslexic symptoms and 50 students of the same academic levels (serving as control group) were randomly recruited from urban and rural regions of Nigeria. These participants were subjected to various clinical tests and evaluations that included, structural and functional magnetic resonance imaging, diffusion tensor imaging, and family history (helps to identify the genetic variation)
Results: The findings suggest that dyslexia is associated more to deficits in attentional mechanisms and dorsal visual stream than phonological deficits.
Conclusions: *Translating this finding into clinical linguistic procedures will pave way for new strategies leading to awareness, early diagnosis and effective treatment of dyslexia*

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S. BANKER, D. PAGLIACCIO, L. THOMAS, R. MARSH & A.E. MARGOLIS. Functional Connectivity of the Spatial Network is Altered in Children With Nonverbal Learning Disability, Specific Learning Disability in Reading, and Typically Developing Children.

Objective: Nonverbal Learning Disability (NVLD) is characterized by visual-spatial deficits and reading disorder (RD) by language deficits. We tested if children with NVLD show altered functional connectivity in the spatial network relative to those with RD and typically developing (TD) children.

Participants and Methods: Useable resting State fMRI data were acquired from 54 children (15 TD, 19 NVLD, 20 RD). ROI-ROI analyses were performed among 12 seeds of a previously defined spatial network. Group differences, and associations between connectivity and impairment (Child Behavior Checklist), were tested controlling for age, sex, and mean motion.

Results: Connectivity from left posterior cingulate (PCC) to right retrolimbic area was reduced in children with NVLD relative to TD children and children with RD. Across all children, connectivity was inversely associated with internalizing (p=0.009) and social problems (p=0.024), and positively associated with school competence (p=0.040). Connectivity from left PCC to right cerebellum was reduced in children with NVLD and with RD, and was positively associated with activities competence and total competence (p's=.05).

Conclusions: Reduced cortico-cortical connectivity characterized children with NVLD and associated with behavioral impairment consistent with NVLD but not RD (internalizing and social problems) pointing to the specificity of these findings to NVLD. Altered connectivity in the spatial network may contribute to the psychological deficits that accompany NVLD, perhaps providing a novel target for treatment. Reduced cortico-cerebellar connectivity characterized children with learning disabilities (LD) and associated with reduced competence in activities such as sports, possibly reflecting motor deficits common to LD. Reduced cortico-cerebellar connectivity also associated with overall sense of competence, possibly reflecting a domain general phenomenon experienced by children with LD.

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N. BECKER, J.B. SBICIGO, G. KOLTERMANN, L.D. PICCOLO, M.R. GOMIDES, G.M. PAIVA, V.G. HAASE & J.F. SALLES. Parental Education: What Tell us About Reading Disabilities Beyond Phonological Processing?

Objective: Multiple deficits model of reading disability (RD) considers environmental factors to understand RD. This study investigated (a) the influence of parental education in children reading performance controlling for phonological processing (PP) measures and (b) the prediction of parental education in RD.

Participants and Methods: We investigated 149 brazilian children between 8 and 11 years old from 3rd and 4th elementary grades. We examined oral reading (OR) and PP measures: forward and backward digit span, RAN letters, numbers and figures (response time) and phonological awareness (phonemic elision - PE). Father's and mother's education were assessed with a brazilian index of socioeconomic status (income and parental education). Brazilian normative sample of the OR was used to determine whether the child had a RD (RD < 16th percentile, n = 35).

Results: In order to test the first aim we run multiple regression analysis that indicated three predictors explaining 32.3% of the variance (R^2=.32, F(3,55)=24.65, p<.001) of OR. PE significantly predicted OR (β =.39, p<.001), as did RAN letters (β =-.28, p<.001) and mother education (β=0,17, p=.01). These predictors were then entered into a binary logistic regression to verify the second aim. Results indicated a significant association between PE, RAN letters, mother education and RD, with the three predictors explaining 23.1% of the likelihood of RD. RD were 12% less likely to occur in children with higher PE performance and it was equally likely to occur both in higher or lower RAN letters performance. Considering this, RD was 52% less likely to occur in children from mothers with higher education.

Conclusions: Mother education impacts in reading performance and in RD, even though considering PP. Possibly, mothers with higher education tend to promote children's literacy skills by reading more for their children, improving their receptive language. Implications for the understanding of the multiple deficits model of RD and public policies impacts will be discussed.

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S. SCOTT & J.E. CASEY. Differentiating Nonverbal Learning Disorder and Higher Functioning Autism on Neuropsychological Variables of Visual Spatial Functioning, Tactile Perception, and Mathematical Achievement.

Objective: There is debate over the extent to which Nonverbal Learning Disorder (NVLD) and Higher Functioning Autism (HFA) or Asperger Syndrome overlap in neuropsychological and psychosocial characteristics, and, consequently, whether they can be clinically differentiated. Some evidence is accumulating to support that certain diagnostically relevant social characteristics meaningfully differ between these two groups. The present study investigated the hypothesis that these two disorders could be differentiated on several cognitive domains that represent areas of neuropsychological weakness relevant to the diagnosis of NVLD.

Participants and Methods: The NVLD group included 10 children (M age=12.8) who met the primary neuropsychological criteria for NVLD (adapted from Casey et al., 1991). The HFA group included 13 children (M age=12.7) previously diagnosed using DSM-IV-TR or DSM-5 criteria by a community psychologist or psychiatrist, without consideration of their neuropsychological test results. Logistic Regression and Receiver Operating Characteristic curve analysis were employed to investigate the extent to which neuropsychological variables spanning the domains of visual spatial functioning, tactile perception, and mathematical achievement would reliably differentiate between these two groups.

Results: The area under the curve (AUC) of composite variables of visual spatial functioning and tactile perception demonstrated excellent discrimination between the groups (AUC=.87 for both variables). Similarly, on a measure of math computations the groups were reliably differentiated with excellent discriminability (AUC = .89), with the NLD group obtaining lower average scores across all domains included in the analysis

Conclusions: The findings support that NVLD and autism spectrum disorder without a comorbid intellectual disability are distinct clinical disorders and that NLVD is a valid neurodevelopmental disorder.

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J. FINLEY, E.F. MATUSZ & F. PARENTE. Neuropsychological Differences Between Individuals with Traumatic Brain Injuries and Specific Learning Disabilities.

Objective: The heterogeneous sequelae of traumatic brain injury (TBI) can often mirror cognitive impairments of specific learning disabilities (SLD). As a result, the presentation of deficits associated with TBI and SLD, such as attention and processing speed, can make these diagnoses difficult to differentiate on cognitive test performance. Currently, the examination of the extent to which these groups differ across different tests of these constructs remains limited, and it remains unclear if specific tests may differentiate TBI and SLD. The current study sought to address this issue by comparing test performance.

Participants and Methods: This study utilized archival data to examine performance differences between patients with TBI (n = 50) and SLD (n = 72) on selected subtests from the Wechsler's Adult Intelligence Scale – Third edition (WAIS-III) and the Halstead Reitan Neuropsychological Battery (HRB). Between-group analyses using listwise deletion were conducted to compare test performance on Digit Symbol (DSY), Symbol Search (SS), Digit Span (DSP) Trail Making Test A (TMT-A), and Trail Making Test B (TMT-B).
Results: Independent t-test analyses yielded only statistically significant group differences on TMT-A (p = .02). On average, patients with SLD scored higher than patients with TBI (M = 122.27 and M = 118.08, respectively) on TMT-B (p > .05), although this was a non-statistically significant difference. However, patients with TBI performed non-statistically significantly better, on average, on DYS (M = 7.29), SS (M = 8.52), and DSP (M = 6.77) than patients with SLD (M = 6.12, M = 6.77, and M = 8.87, respectively).
Conclusions: These findings suggest that simple tests of processing speed may best differentiate individuals with TBI and SLD. Although non-significant, the results may also suggest that individuals with SLD perform relatively worse on complex tests of attention and processing speed, as these tests likely tap into additional cognitive domains that is more reflective of SLD presentation.
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K. GANESALINGAM, N. ONG, B. BAILEY, J. CRAMSIE, S. DREVENSEK, A. HODGE, K. JENG, R. SUTHERLAND, M. WILLIAMSZ & N. SILOVE. Anxiety Disorders Among Primary School Children and its Association with Neurocognitive Factors and Specific Learning Disorder in Reading.
Objective: Anxiety disorders among primary school children is a significant mental health concern. The general understanding is that anxiety negatively impacts cognition and reading outcomes, but the findings to date are variable. We examined whether the presence of an anxiety disorder affected neurocognitive factors (intellectual ability, attention, executive functions and learning/memory), and specific reading components (phonological awareness, single word reading, and passage comprehension).
Participants and Methods: Participants included 7 to 13 year old children with a DSM-5 diagnosis of Specific Learning Disorder in reading, assessed at the New South Wales Centre for Effective Reading, Australia. Of the 106 participants, 35% had a DSM-5 diagnosis of an anxiety disorder. Participants underwent reading assessments that examined phonological awareness, single word reading and passage comprehension, and neurocognitive assessments that examined intellectual ability, attention, executive functions, and learning/memory. Parent and teacher questionnaire ratings of attention and executive functions were also obtained.
Results: Participants with and without an anxiety disorder did not differ demographically. Participants with an anxiety disorder were more likely to have executive deficits specific to verbal abstraction (p=.03) and parent ratings of mental flexibility (p=.04) but the two groups did not differ on any of the other measures of executive functions, attention, learning/memory, intellectual ability or specific reading components.
Conclusions: Overall findings suggest that anxiety is not consistently related to reading outcomes or neurocognitive factors with the exception of specific executive deficits (verbal abstraction and mental flexibility). Further research is required to: (i) determine whether current findings are consistent among other samples, and (ii) consider the interaction between anxiety and the identified executive deficits on reading outcomes.
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J.M. GUERIN & Q.R. MANO. The Role of Cognitive Proficiency in Reading and Math Achievement.
Objective: It is generally well-accepted that accumulation of knowledge and academic skills relies on a foundation of problem-solving and reasoning abilities (i.e., fluid reasoning; G*f*). More recent evidence suggests that G*f* itself is supported by the cognitive abilities of working memory (WM) and cognitive processing speed (PS), which together form an important cognitive construct, termed Cognitive Proficiency (CP). Research suggests that CP reflects a child's capacity to learn efficiently; however, no study has examined its direct and/or indirect role(s) in reading or math achievement.
Participants and Methods: In a clinical sample of 36 children (ages 6-15) being evaluated for specific learning disorder, we examined direct and indirect (through G*f*) effects of CP on untimed word reading and untimed math calculation using two mediation models. G*f*, reading, and math were all measured with standardized tests. CP was measured using a composite score derived from standardized tests of WM and PS.
Results: Results of the first mediation analysis revealed a significant direct effect of CP on word reading. CP did not exert an indirect effect on word reading through G*f*. Results of the second analysis similarly revealed there to be a direct effect of CP on math calculation. In contrast to word reading, the direct effect of CP on math calculation in the total effect model was weakened in the presence of G*f*, suggesting that CP also has an indirect effect (through G*f*) on math calculation.
Conclusions: Results expand our understanding of how fundamental cognitive processes—namely working memory and processing speed—may uniquely contribute to both reading and math achievement. Results also support and build on Cattell's Investment Theory by demonstrating that basic cognitive abilities, in addition to other higher order cognitive processes, are important for skillful academic functioning. Implications for the specific role of fluid reasoning in math achievement are discussed.
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S.R. HOOPER. Derivartion and Use of Novel Working Memory Measures:Their Prediction of Written Language Functions in Young Elementary School Children.
Objective: The primary objective of this study is to examine whether "pure" measures of verbal and visual working memory, statistically purged of variance associated with short-term memory, would be predictive of writing outcomes. A second objective is to determine whether these relations would be moderated by gender or at-risk writing status.
Participants and Methods: The sample included 205 first grade students who were assessed in both first and second grades (57.1% male, 34.6% minority) and classified as typically developing writers (32.7%) or at-risk for a writing disability (67.3%) on the WIAT-2. Other measures included the *Wechsler Intelligence Scale for Children-IV-Integrated* Digit Span and Spatial Span subtests, and the *Wide Range Assessment of Memory and Learning* Picture Memory and Story Memory subtests. Data analyses involved creation of the residualized measures of working memory, examination of the relations between these measures and writing outcomes (WIAT-2 Written Expression, Spelling, Written Language Composite), and determining moderation of the outcomes by risk status and gender.
Results: Findings revealed that the residualized variables for both verbal and visual working memory had strong effects for predicting written expression (p<.001), spelling (p<.001), and the writing composite (p<.001). The relationships were stronger for residualized visual working than verbal working memory for all three outcomes. At-risk status and male gender significantly moderated the relations between the residualized variables and writing outcomes.
Conclusions: Findings from this study demonstrated a statistical strategy to create a measure of working memory wherein the residualized components theoretically represent a more "pure" measure of this construct across modalities. These residual measures proved useful in

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predicting written language outcomes in young children, and supported earlier findings indicating the importance of working memory to the writing process.

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L.R. KIVISTO, A.M. O'BRIEN, R.J. RICHARDSON & J.E. CASEY. Differences in Reading Ability of Canadian Children Instructed in French Immersion and Primarily in English.

Objective: Enrollment in French Immersion (FI) schools has been steadily rising in Canada since 2011 with over 400,000 students enrolled in 2016 (Statistics Canada, 2017). Few studies have examined the differences in reading ability in English between FI students and students in primarily English schools (PE). Results have found that FI children have roughly equivalent English reading skills to PE children by grade 3, and outperform them by grade 6 (Lapkin, Hart, & Turnbull, 2003). Prior to grade 3, studies have typically found lag in English reading for FI children (Lapkin, Hart, & Turnbull, 2003). Given the large numbers of Canadian children in FI, it is crucial to determine whether mean differences in English reading ability are present and how these may influence psychological and neuropsychological test results. The current study examined the reading rate, accuracy, and comprehension of FI and PE students. It was predicted that FI children would outperform PE children on these measures.

Participants and Methods: Data was analyzed for 78 school-aged children (aged 7-13 years, $M_{age} = 10.03$) enrolled in FI ($n = 35$) and PE ($n = 43$) schools. Participants were administered the GORT-5 individually at their school as part of a larger study.

Results: MANOVA revealed that FI students performed lower compared to PE students on measures of reading rate ($R^2_{adjusted} = .319$, $p < .001$), accuracy ($R^2_{adjusted} = .186$, $p = .001$), and comprehension ($R^2_{adjusted} = .343$, $p < .001$) when controlling for estimated FSIQ, age, and learning disorder diagnosis.

Conclusions: Contrary to the hypothesis, the results suggest that children instructed in FI do not perform as well as their PE peers on measures of reading fluency and comprehension. This has implications for the neuropsychological assessment of FI and by extension bilingual students given that existing normative data consist of students primarily taught in English. Thus, further research is needed to determine the differences in English reading development between FI and PE students.

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W. LACEY, P.T. CIRINO, Y. AHMED, P. MASSMAN & T. TOLAR. The Role of Magnitude Processes, Working Memory, and Fractions for Learning Algebra.

Objective: The present study investigates the role of domain general and domain specific skills for algebra. We focus on working memory and magnitude processes (comparison and estimation), and contextualize their impact with fractions performance in 9th graders. We expected to find that end year algebra performance would be predicted by fraction performance, fraction number line, whole number line, working memory, and symbolic comparison. Algebra growth across the year was expected to have the same pattern.

Participants and Methods: Participants included 96 9th grade students. Students were given cognitive and math measures at the beginning of the year and math measures at the end of the year. All students were instructed in English, 11% of subjects had limited proficiency in the English language. 54% were male and 67% were Hispanic/Latino, 26% Black, and 6% Caucasian.

Results: The overall model for end of year algebra, $F(6, 64) = 11.28$, $p < 0.01$, $R^2 = 0.51$, was significant, with fraction performance, $p < 0.001$, and fraction number line, $p < 0.001$, as significant predictors. Change over the course of the year was predicted through the use of Latent Change Analysis, ANCOVA, and repeated measures ANOVA. Fraction number line performance was the strongest significant predictor across all three predictors of change.

Conclusions: The current study found evidence of significant contributions of fractions performance and fraction number line to predicting end of year algebra performance. These results were robust in the context of other relevant predictors, as well as when including beginning of the year algebraic knowledge. The results emphasize the role that understanding rational numbers plays in the development of mathematics but also extending this impact specifically to algebraic learning across a school year. These results may help inform instructional techniques and cognitive supports to encourage understanding of rational numbers as a predictor of algebra performance.

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K.T. MACDONALD, K.K. HALVERSON & P.T. CIRINO. The Roles of Behavioral vs. Cognitive Attention in Reading among Struggling Readers.

Objective: This study examined the differential contributions of behavioral vs. cognitive measures of attention to different types of reading skills (word reading, fluency, comprehension) among struggling readers. We predicted moderate relations between behavioral and cognitive measures, and hypothesized that both would account for unique variance and growth in reading, especially comprehension, in the context of other predictors. We also anticipated a directional relationship between attention and reading such that beginning of year attention would predict end of year reading, and that this would be most pronounced for comprehension.

Participants and Methods: Participants included 280 4th and 5th graders who were identified as struggling readers. Students were given tests of reading and cognitive attention at the beginning of the school year, and tests of reading, cognitive attention, and behavioral attention at the end of the year.

Results: Bivariate correlations between behavioral and cognitive attention were small to moderate ($r = 0.16$-0.30). Hierarchical regressions revealed that cognitive and behavioral attention made significant contributions to all reading outcomes, but only behavioral attention predicted reading after considering other predictors, and this was only significant for comprehension. Similarly, repeated measures ANOVAs showed that growth in comprehension was predicted by behavioral attention. Directional findings from cross-lagged panel models differed for each type of reading outcome.

Conclusions: Results suggest that cognitive and behavioral attention both contribute to reading, but only behavioral attention demonstrated contributions in the context of other predictors. However, findings regarding the role of cognitive attention in reading highlight the need to further investigate the roles of different aspects of cognitive attention through the use of experimental paradigms. Results should guide future models of attention as well as practical approaches to measuring attention in academic contexts.

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E. O'CONNOR DERIKOZIS, M. HUHTALA, A.M. O'BRIEN & J.E. CASEY. The Association of Phonological Awareness as Measured by the CTOPP-2 to Reading Performance.

Objective: Phonological awareness (PA) is strongly associated with reading development (Nanda et al., 2014), and is often included in the neuropsychological assessment of children to support a diagnosis of reading disability. The PA Composite of the CTOPP-2, a commonly utilized measure of PA, comprises three subtests. Although previous literature with clinical samples suggests that the Elision (EL) subtest

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may be a better predictor of reading ability than Blending Words (BW) or Phoneme Isolation (PI), no study has examined this relationship in a general population of children. The present study examined the extent to which EL, BW, and PI predict reading performance in typically-developing school-aged children.

Participants and Methods: Participants (N = 80) were typically-developing school-aged children (M_{age} = 9.88, range: 7-14 years) recruited from English and French Immersion schools across Southwestern Ontario. Multiple linear regression (MLR) analyses utilizing CTOPP-2 PA subtests were calculated to predict reading ability on the WIAT-III Basic Reading composite (BRC), Word Reading (WR), and Pseudoword Decoding (PD).

Results: Because PI lacked a linear relation with the outcome variables, it was omitted from subsequent analyses. The overall regression model with the two remaining subtests significantly predicted BRC [$F(2,79) = 6.54$, $p < .01$], but neither EL nor BW were significant unique predictors ($p > .05$). Regression analyses of WR and PD separately were also both significant ($p < .01$). EL was a significant predictor of PD ($\beta = .28$, $p = .03$), but not WR ($\beta = .11$, $p > .05$), whereas BW significantly predicted WR ($\beta = .26$, $p = .04$), but not PD ($\beta = .16$, $p > .05$).

Conclusions: The findings suggest that EL and BW predict different components of reading performance. It is proposed that EL has a stronger relationship with phonological decoding whereas BW may relate more to sight word reading. PI may evaluate other dimensions of reading performance.

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G. SPADONI, L. DIARI, S. TOCCHINI & M. TIMPANO SPORTIELLO. Learning Disabilities and Emotional Recognition: There is a Relation?

Objective: Studies highlight that many subjects with Learning Disabilities (LD) have problems in social function (Girli & Domaz, 2018) while neuroimaging research show that LD group have hyperactivity in the right socio-emotional areas (Gorno Tempini, 2017) and so a bright social cognition ability. These possible difficulties have often been seen as a secondary to the cognitive problems but research showed that socio-emotional abilities have a central role in defining LD (APA, 1994). In particularly, an important indicator of social functioning is the ability to understand, recognize and express emotions from facial expressions (Boyatzis & Satyaprasad, 1994). Moreover, this ability is an important discriminator that influence children's general adaptations to school and social competence among peers (Zuckerman & Przewuzman, 1979). So, we ask if, in this population, social cognition, is a strength or weakness ability?

Participants and Methods: 20 patients: 10 children (age: 8-12) and 10 adolescents (age: 12-19) with LD; and 20 Healthy control. We used *Wechsler Intelligence Scale for Children-IV*(WISC-IV) and *Wechsler Adult Intelligence Scale*(WAIS-IV) to assess cognitive ability, MT 8-14 and 16-19 (Cornoldi & Candela, 2015) to assess reading and writing ability and battery for the emotion recognition from faces (Facial Emotion Recognition Battery, FERB) and prosody (Prosody Emotion Recognition Battery, EPRB).

Results: Children with LD show more difficulties than their peers, in particularly they have difficulty in interpreting cues about prosody ($p<.01$) and facial expressions ($p<.05$). Moreover adolescent have significant lower scores than children, both in EPRB ($p<.01$) and FERB ($p<.05$).

Conclusions: Results show that patients with LD have more difficulties to read social stimuli, in particularly basic emotions from faces and prosody, than HC. Moreover our results highline that adolescents, with late diagnosis of LD, have more difficulties than children, suggesting that these abilities should be enahanced.

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A. SYLVIA & Q.R. MANO. Test Anxiety, Fluid Reasoning, and Reading Comprehension Among Adults Referred for Learning Difficulties.

Objective: Many studies have found that individuals with reading difficulties and other learning disabilities (LD) have higher levels of anxiety when compared to controls. Although this pattern is observed consistently in studies of LD populations through childhood and into adulthood, little research has been done to understand the cognitive processes that support the cooccurrence of anxiety and reading comprehension difficulties in individuals with learning vulnerabilities. To address this gap in the literature our study examines the direct and indirect effects of test anxiety on reading comprehension in a population of adults vulnerable to LD diagnosis.

Participants and Methods: A sample of 97 adults (M_{age} = 25.23; SD_{age} = 7.59) presenting to a university LD clinic were administered measures of test anxiety (Test Anxiety Inventory), reading comprehension (WIAT-III), processing speed, working memory, fluid reasoning and crystallized intelligence (latter derived from the WAIS-IV). A joint serial mediation analysis was conducted to assess for the effects of test anxiety on reading comprehension, through the serial action of processing speed, working memory, fluid reasoning and crystallized intelligence, while controlling for basic reading skills, trait anxiety, depression, and ADHD symptomatology.

Results: The direct effect of test anxiety onto reading comprehension was non-significant. However, results showed that test anxiety exerts an indirect effect onto reading comprehension through fluid reasoning. Specifically, higher test anxiety is associated with lower fluid reasoning, which interactively results in diminished reading comprehension performance.

Conclusions: In support of previous literature pointing to the importance of higher order cognitive abilities and executive control in the relationship between anxiety and reading, fluid reasoning is shown to provide a pathway for test anxiety to negatively influence reading comprehension.

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I.A. WESTERS, H.J.G.P.C. JANSSEN, R. MAES, K. RONNEPER & J. EGGER. The Relation Between Habituation, Intelligence and Working Memory in Normal Functioning Adults.

Objective: Previous Research Suggests that Habituation, as Assessed During Infancy, is Related to Later-Life Working Memory (WM) and Intelligence (IQ). The Present Study Examined the link Between Habituation, WM, and IQ Beyond Infancy, Specifically Assessing Whether WM Mediates the Relation Between Habituation and IQ.

Participants and Methods: Thirty-One Participants Completed an Operation span task, a Habituation task, and four Subtests from an Intelligence test. The Habituation task Consisted of an Oddball task in Which two Visual Stimuli each Required a Different Response. The Stimuli were Preceded by an Auditory Stimulus that was Relatively Frequent (Standard) or rare (Deviant); one Condition also Included Trials Without a Preceding Stimulus. The Deviant Stimuli were Expected to Initially Result in Increased Response Times to the Visual Target Stimulus Through Distraction, Followed by a Decrease Reflecting Habituation.

Results: The Results Only Revealed a Significant Association Between WM and IQ. All Other Relations, Including the Mediation, were not Significant.

Conclusions: In the Present Adult Sample, Habituation was not Associated with IQ, Neither Directly nor Indirectly via WM. We Speculate that the Present null Results are Related to Between-Study Procedural Differences in the Oddball task. A Complete Randomized Presentation of Deviants, as in the Present Study, Might Mainly Elicit Bottom-Up Processes. Instead, a Pseudo-Randomization, Implying Regularities and Possible Prediction of the Upcoming Stimuli, Might Encourage Top-Down Processes. This Might be a Crucial Difference Given that

Previous Studies Suggest that, Relative to Infants, Adults have strong Automatic Bottom-Up Processing Capacities. Moreover, Adults tend to Primarily use Top-Down Attentional Processes, Which, when Elicited in a Given (Oddball) task, Might be Related to Higher-Order Processes underlying WM and IQ.

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R. WINTER, J. FRIJTERS, L. BRANUM-MARTIN, E. RIGGALL, R. SEVCIK & R.G. MORRIS. Modeling the Relation Between Working Memory and Reading Intervention Outcomes in Struggling Readers.

Objective: Our study explores three theoretical models for understanding working memory (WM) in struggling readers. Research has shown relations between working memory and reading especially on foundational phonologically based reading tasks like non-word repetition. However, there is limited research exploring the modeled relation between non-language based WM tasks and basic reading abilities. Here we utilize three models of WM to explore the best theoretical basis for understanding both foundational reading and response to intervention among a group of elementary school struggling readers. The three models are driven by theories from: 1. Baddeley and Hitch (1974); 2. Engle et al., (1999) and 3: Brown and Hulme (1996).

Participants and Methods: 82 children (mean age: 9.93) in grades 3-4 were assessed as meeting criteria for a reading disability and subsequently participated in a 70-hour intensive reading intervention. Children were administered nine working memory, intelligence, and language tasks prior to the intervention and then tested at four time points on four single word reading tasks at baseline, 23, 45 and 70 hours over the course of the intervention. Three theoretical models were fit to the resulting data using structural equation modelling.

Results: Model 1 (based on Baddeley and Hitch, 1974) revealed the best fit for the data (RMSEA = 0.012; Chi Squared = 49.57 (df=49); CFI =0.995) with phonological WM (standardized estimate = 0.37) and central executive (standardized estimate = 0.22) latent factors showing the strongest correlation with initial single word reading scores

Conclusions: These results suggest that phonological WM, visuo-spatial WM, and central executive WM reflect separate but related constructs. This data also support the fundamental connection between phonological WM and single word reading, and introduces the potential for an underlying language free component of WM contributing to single word reading abilities.

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Medical/Neurological Disorders/Other (Child)

H.A. ALEKSONIS, E. SEMMEL & T. KING. Associations among Subcortical Brain Volumes and Adaptive Functioning in Long-Term Survivors of Childhood Brain Tumors.

Objective: Survivors of childhood brain tumor are at risk for difficulties in adaptive functioning (AF), skills that facilitate independent living. Research has implicated subcortical brain volumes in cognitive skills that are important for AF, such as learning, planning, and memory. The objective of this study was to explore associations among AF and volumes of the putamen and hippocampus. We also investigated whether volume of these brain regions predict AF above and beyond the Neurological Predictor Scale (NPS), a measure of cumulative neurological risk factors.

Participants and Methods: 59 adult survivors underwent MRI, and informants (parents, spouses) completed the Scales of Independent Behavior-Revised (SIB-R). Hippocampal and putamen volumes were calculated in SPM8. Partial correlations assessed relationships among SIB-R and bilateral hippocampal and putamen volumes while controlling for intracranial vault (ICV) volume and age. Hierarchical regressions tested whether volumes predict SIB-R above and beyond the NPS.

Results: Larger volume in the right and left putamen was associated with higher scaled scores on SIB-R domains: Social Communication (r=.42, .46), Personal Living (r=.44, .45), Community Living Skills (r=.38, .41), and Broad Independent Living Skills (r=.41, .44). Larger volume in the right hippocampus was associated with higher Gross Motor abilities (r=.40). Regressions revealed that the left putamen was a significant predictor of SIB-R Toileting (ΔR^2=.183, p=.012) and Dressing (ΔR^2=.110, p=.039) within the Personal Living scale above and beyond the NPS.

Conclusions: This study found that subcortical volumes, specifically those of the putamen, are associated with AF in long-term survivors of pediatric brain tumor. In fact, left putamen volume predicted toileting and dressing above and beyond a measure of cumulative neurological risk, suggesting an especially robust relationship. Future research should examine the neural systems supporting the role of the putamen in daily skills and cognition.

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G. ALVAREZ, L. BLACKWELL & R. HOWARTH. Medication Management and Functional Recovery in Anti-NMDA Receptor (Anti-NMDAR) Encephalitis.

Objective: Anti-NMDAR encephalitis is a rare autoimmune disease that results in functional deficits. Given the multitude of symptoms that present in pediatric populations, patients often require adjunct medications for symptom management in addition to treatment for the primary disease. Little research exists on whether symptoms of anti-NMDAR encephalitis and related medical treatment are associated with recovery patterns in pediatric patients. This study examined symptoms and medical treatment of patients as related to early functional outcomes.

Participants and Methods: Data was collected through retrospective chart review. Patients were 26 children (35% male, 62% African American, age M=10.8 years, length of stay M=39 days) with anti-NMDAR encephalitis requiring inpatient rehabilitation. Level of functioning (Functional Independence Measure for Children; WeeFIM) was assessed at admission and discharge. Patients were divided into two groups based on change in total WeeFIM score over the course of rehabilitation, including low (N=9) and high responders (N=17).

Results: One-way ANOVA revealed low responders (M=6.86) were younger than high responders (M=12.87), $F(1, 25)=11.17$, $p<.01$. Hierarchical logistic regressions demonstrated treatment for seizures was predictive of low functional gain above and beyond age, $X^2(1)=5.53$, $p<.05$, as was treatment for movement disorders, $X^2(1)=15.77$, $p<.01$. There was a trend for those treated with two or more antipsychotics to show higher functional gain, p=.056. There were no differences in treatment for sleep or agitation.

Conclusions: Results suggest that different symptoms and medical treatment in pediatric anti-NMDAR encephalitis are related to differences in early recovery of skills, and may have important prognostic implications. Additional research is needed to better classify presentations and treatment for this disease to determine how differences are associated with short- and long-term functional outcomes.

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D. BADALY, C. BURNS, R. CESCHIN, V.K. LEE, S. SULAIMAN, A. ZAHNER, G. MICHELLE, S. BEERS, C.W. LO & A. PANIGRAHY. Cerebellar and Prefrontal Structures Associated with Executive Functioning in Children and Adolescents with Congenital Heart Defects.

Objective: Children and adolescents with congenital heart defects (CHD) often display cognitive and behavioral manifestations of executive dysfunction. Although research has traditionally focused on the development of prefrontal systems and executive functions, emerging research highlights the importance of the cerebellum. We considered the unique and interactive effects of prefrontal and cerebellar brain structures on executive functioning among youths with CHD.

Participants and Methods: We prospectively recruited 26 children and adolescents with CHD (*M* age = 12.03, *SD* = 2.99); 73% male) and 47 healthy controls (*M* age = 11.93, *SD* = 3.12; 53% male). Participants completed magnetic reasonance imaging (MRI) of the brain, and we extracted volumetric data on prefrontal and cerebellar regions. They also completed face-to-face and computerized tests of processing speed and executive functioning; their parents filled out behavioral ratings of their executive functions.

Results: Regions of the lateral, medial, and orbital prefrontal areas were significantly smaller among participants with CHD, as compared to controls ($ts > 2.16$; $ps < .05$). The inferior cerebellar vermis also differed between the groups, but only when data were normalized for overall brain volume ($t = 2.39$, $p = 0.02$). Participants with CHD had slower processing ($ts > 2.99$, $p < .005$) and poorer executive functioning ($ts > 2.10$, $p < .05$) on select cognitive and behavioral measures ($ts > 2.11$, $ps < .05$), versus controls. For both groups, prefrontal and cerebellar volumes were significantly associated with a subset of indices for processing speed and executive functioning ($ps < .05$). Interestingly, select associations between prefrontal regions and measures of executive functioning were moderated by cerebellar volume ($ps < .05$).

Conclusions: Study results provide the first evidence that, among children and adolescents with CHD, the cerebellum may modulate links between prefrontal regions and executive functions.

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B. BIEKMAN, J. BICK & P.A. KULESZ. Prefrontal cortex thickness and SES as predictors of executive functions in children with spina bifida myelomeningocele.

Objective: Spina bifida myelomeningocele (SBM) is a highly debilitating birth defect that causes dramatic neural disruption. SBM also causes a mixture of deficits and assets in a myriad of cognitive constructs. Attentional control, a component of executive functioning, is an interesting construct that has not been fully examined in SBM. SES and prefrontal cortex thickness have been established as correlates of attentional control in typically developing (TD) children. We wanted to know whether they were also related to attentional control in children with SBM.

Participants and Methods: Thirty TD children and seventy-five children with SBM were recruited. FreeSurfer was used to measure cortical thickness. To measure attentional control, we used the Opposite Worlds subtest of the Test of Everyday Attention for Children (TEACH). We hypothesized that SES and prefrontal cortex thickness would be positively related to attentional control for both groups. We used multiple regression analyses with right and left dorsolateral prefrontal cortex (DLFPC) volume and SES as predictors and TEACH opposite worlds scores as the outcome.

Results: There were no differences in right or left DLPFC thickness between the TD and SBM groups. Children with SBM had lower SES and lower TEACH opposite worlds scores than TD children. SES and right DLPFC thickness as well as SES and left PFC thickness were related to scores of the opposite worlds subtest of the TEACH in the SBM group but not the TD group. Furthermore, SES was *positively* correlated with TEACH opposite world scores but DLPFC thickness was *negatively* correlated with those scores.

Conclusions: SES predicts attentional control in children with SBM, possibly suggesting that SES is a protective factor against some of the cognitive debilitation associated with SBM. Furthermore, lower cortical thickness predicted attentional control in children with SBM, possibly suggesting that developmentally appropriate synaptic pruning is protective against the cognitive insults of SBM on executive functioning.

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J. CHANG, P. ESPE-PFEIFER & M. FOLEY-NICPON. The Neuropsychological Functioning of Children and Adolescents with Anorexia Nervosa.

Objective: Researchers have suggested there is a wide range of neuropsychological deficits individuals with anorexia nervosa (AN) possess, including impairments in nonverbal reasoning, attention and processing speed, memory, and executive functioning. While growing, examination of the neuropsychological functioning of children and adolescents with AN is quite sparse compared to the abundance of research on adults with AN, and the many conflicting findings have been attributed to inconsistent methodologies across studies. This study examined the neuropsychological functioning of children and adolescents with AN by conducting a quantitative study loosely based on Bayless et al. (2002) and Remberk et al. (2011).

Participants and Methods: Participants were 43 female children admitted to an inpatient eating disorders program at a large, Midwestern teaching hospital. Neuropsychological assessments were conducted as part of routine clinical care. The first analysis examined the clinical data (i.e., BMI-for-age percentile on testing date, age of onset of AN, and duration of AN) and neuropsychological test scores of participants. The second analysis focused on the clinical data and EDI-3 scale scores for the participants.

Results: Results indicated verbal intellectual functioning was significantly higher than other intellectual domains, and verbal memory was almost significantly higher than nonverbal memory ($p = .051$). Negative correlations were found between individual subtests and clinical data (e.g., age of onset of AN and duration of AN) as well as the EDI-3 Personal Alienation scale and the BMI-for-age percentile.

Conclusions: Clinical implications include providing treatment improving cognitive functioning and implementing a biopsychosocial model. Anorexia nervosa is a nationwide problem affecting large numbers of adolescent females. By conducting neuropsychological assessments with children with AN, health professionals may gain a better understanding on how to provide effective treatment and optimize academic interventions.

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K. COULEHAN, N. KATZ, C. MOOTOO, S.A. MANDELBAUM & H.A. BENDER. Neuropsychological Functioning and Hemispheric Disconnection Symptoms in a Child with Agenesis of the Corpus Callosum.

Objective: Agenesis of the corpus callosum (AgCC) is a rare congenital disorder that disrupts the connections between cerebral hemispheres. The present case study describes the neuropsychological (NP) functioning and hemispheric disconnection symptoms of a child with AgCC. Such cases provide unique insight onto the functionality of the two hemispheres.

Participants and Methods: An eight-year-old male prenatally diagnosed with complete AgCC underwent a comprehensive clinical NP assessment secondary to academic under-achievement. Medical history is otherwise unremarkable. Motor milestones were met within a typical timeframe. Language development was reportedly delayed. Tests assessing previously-identified "split brain patterns" were conducted to examine symptoms of hemispheric disconnection.

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Results: Overall IQ was average and all academic skills were borderline to extremely low. Average NP performances were observed for basic attention, verbal and nonverbal reasoning, receptive language, verbal fluency, and visuoconstruction. Verbal memory skills were within normal limits, whereas visual memory was variable. Borderline to extremely low performances were noted for processing speed, working memory, set-shifting, inhibition, and expressive language. Left-handed fine motor dexterity was significantly weaker than right handed dexterity. Updated replications of tasks initially completed by Sperry and colleagues indicated mixed findings regarding hemispheric disconnection symptoms.
Conclusions: Through case study, we were able to examine early childhood developmental outcomes of a male with complete AgCC diagnosed prenatally. Pure behavioral disconnection found in those with corpus callosotomies was not observed. As such, this child likely developed compensatory pathways, thereby explaining preserved islands of interhemispheric transfer. Assessing beyond conventional neuropsychological measures yielded valuable insights onto this child's unique functional neuroanatomy and, by extension, treatment planning.
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M. ENGELMANN, R. MCLAUGHLIN & K.E. JONES. Early Cognitive Recovery in a Pediatric Case of Familial Acute Necrotizing Encephalitis.
Objective: Acute necrotizing encephalitis (ANE) is a rare neurological condition typically preceded by viral febrile illness that rapidly progresses to encephalopathy. Early imaging most commonly reveals symmetrical multifocal lesions in the thalami, but also in other subcortical regions, the brainstem and cerebellum. Recently, familial autosomal dominant ANE due to mutations in the RANBP2 gene have been reported with recurrent episodes triggered by viral febrile illness. This case describes the neurobehavioral status and recovery of a previously healthy child who developed ANE and was later found to have the RANBP2 mutation.
Participants and Methods: The patient is a 12-year-old girl who developed ANE following influenza B. Genetic testing confirmed RANBP2 mutation. Initial imaging indicated abnormalities throughout the thalami, basal ganglia, brainstem, and cerebellum. She was followed by neuropsychology from her acute inpatient rehabilitation admission until 2 months post-onset, at which time a comprehensive neuropsychological evaluation was completed to assist with school and community reintegration.
Results: At 2 months post-onset, MRI showed improved but persisting abnormalities. On testing, she demonstrated slowed processing speed, variable attention, and variable memory encoding and retention. Neurocognitive functioning was otherwise intact. Her gross and fine motor functioning remained significantly impaired.
Conclusions: The patient made rapid gains in cognitive functioning but exhibited ongoing cognitive and motor weaknesses consistent with injury to subcortical structures, brainstem, and cerebellum. This case study provides a comprehensive picture of the short-term cognitive and motor sequelae of pediatric ANE. Given the high-risk of recurrence associated with this subtype of ANE, implications for ongoing monitoring are discussed.
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M.E. FASANO-MCCARRON, J. HOLMES BERNSTEIN, D.P. WABER, J.W. NEWBURGER, D.R. DEMASO, D. BELLINGER & A.R. CASSIDY. Performance on the ROCF at 8 Years Predicts Academic Achievement at 16 Years in Individuals with Critical Congenital Heart Disease.
Objective: To examine longitudinal associations between 8-year visual-spatial performance and 16-year executive function (EF) and academic outcomes in children with dextro-transposition of the great arteries (d-TGA).
Participants and Methods: The sample included 133 youth with d-TGA. The Rey-Osterrieth Complex Figure (ROCF, Developmental Scoring System) was administered at 8 years of age and the BRIEF (Parent, Teacher, Self) and WIAT-II at 16 years of age. ROCF protocols were classified by organization (organized/disorganized) and style (part-oriented/holistic). Two-way univariate (ROCF organization x style) ANOVAs were computed with 16-year EF and academic outcomes as the dependent variables.
Results: There were significant main effects of organization for Reading $F(1, 129) = 12.73$, $p = .001$, partial eta$^2 = .09$, Math, $F(1, 129) = 8.94$, $p = .003$, partial eta$^2 = .07$, Associative, $F(1, 129) = 11.11$, $p = .001$, partial eta$^2 = .08$, and Assembled academic skills, $F(1, 129) = 11.45$, $p = .001$, partial eta$^2 = .08$, with better organization associated with better academic performance. The interaction of organization x style was not statistically significant. For the BRIEF, there was a significant two-way interaction for the parent-reported Metacognition Index, $F(1, 129) = 4.98$, $p = .03$, partial eta$^2 = .04$; parents endorsed more problems for the disorganized/holistic group ($M = 66.5$, $SD = 8.9$) than all other groups (Ms = 53.8-56.6, SDs = 10.3-12.3, Cohen's ds = 0.9-1.3). ROCF performance was not related to any other BRIEF scores.
Conclusions: Performance on the ROCF, a visuospatial task, in children with critical congenital heart disease can forecast academic performance in both reading and mathematics nearly a decade later. This finding may have implications for identifying risk in children with other medical and neurodevelopmental disorders affecting brain development.
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T.B. FAY-MCCLYMONT, D. MONAGEL, F. SCHULTE, W.S. MACALLISTER, B.L. BROOKS, M. MBURU, M. LEAKER & G. GUILCHER. Neuropsychological and Quality of Life Outcomes in a Cohort of Children with Sickle Cell Disease Undergoing Matched Sibling Donor Hematopoietic Cell Transplant.
Objective: Neuropsychological effects of sickle cell disease (SCD) are under-studied. Objectives of this study were to examine neuropsychological performance in children with SCD prior to matched sibling donor (MSD) hematopoietic cell transplant (HCT), and serial neuropsychological performance in children pre and post-HCT using a nonmyeloablative conditioning regimen.
Participants and Methods: 12 children (5-17 years; mean age=10.3, SD=3.8; 9 Female) received a neuropsychological assessment prior to MSD HCT with nonmyeloablative conditioning (alemtuzumab and 300 cGy total body irradiation). MRI and transcranial doppler results were normal in 11/12 children. Six children were seen at 2-years post-HCT (mean=28.3 months, SD=10.8); 6 children are not two years post-HCT yet.
Results: Mean FSIQ (Wechsler) pre-HCT was 91.0 (SD=9.4; Range=76-106). Pre-HCT processing speed (mean=93.2; SD=6.2), inhibition (mean=8; SD=2.3), impulsivity (mean=96.6; SD=13.4), visual memory (mean=101.6; SD=13.0), verbal memory (mean=105.1; SD=11.8), and academics (means=94.8-99.3; SD=16.1-23.1) were average overall. Fine motor speed/dexterity (mean=87.0; SD=13.1) and sustained attention (mean=91.2; SD=19.4) were areas of relative weakness. Parents did not endorse problems with attention, executive functioning, behaviour, or adaptive functioning on questionnaires, and reported a fair to good quality of life (QOL) overall. Post-HCT test results demonstrated stability in FSIQ, memory, and academics, but improvements in processing speed, inhibition and QOL. Reliable declines (>1 SD) in attention and fine motor speed/dexterity were noted post-HCT in 2 of 5 children.
Conclusions: At the group level, this cohort of children with SCD pre-HCT demonstrate average neuropsychological functioning, with weaknesses in attention and fine motor abilities. Following HCT with a nonmyeloablative regimen, children demonstrate mostly stable results, with some improvements in processing speed and quality of life and possible declines in areas of pre-existing weaknesses.

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M.E. FOX & T. KING. The Neurological Predictor Scale as a Predictor of Poorer Adaptive Functioning via Executive Dysfunction.

Objective: Improved treatment has led to increased survival rates following childhood brain tumors, but many survivors experience neurological sequelae that disrupt everyday adaptive functioning (AF) skills. The Neurological Predictor Scale (NPS), a cumulative measure of tumor treatments and sequelae, has been shown to predict cognitive outcomes, but findings on its relation to informant-reported executive dysfunction and AF are mixed. Given known effects of apathy and other frontal-subcortical system disruptions on AF, this study assessed NPS' relationship with AF as mediated by executive dysfunctions measured by the Frontal Systems Behavior Scale (FrSBe) in survivors.

Participants and Methods: 75 participants (41 female; M_{age}=23.5, SD_{age}=4.5) were survivors of childhood brain tumors at least 5 years past diagnosis. FrSBe and Scales of Independent Behavior-Revised (SIB-R) were administered to informants. Statistics were run in SPSS Statistics 25.0 and PROCESS 3.0.

Results: NPS was correlated with FrSBe Apathy and Executive Dysfunction (ED) domains but not Disinhibition. NPS was correlated with all SIB-R domains; more complex treatment and sequelae was correlated with poorer function. Parallel multiple mediator models of NPS predicting SIB-R subscales with Apathy and ED as mediators were significant overall for all subscales: Motor Skills (MS; B=-0.09, SE=0.06, CI:-0.22,-0.01), Social Communication (SC; B=-0.08, SE=0.04, CI:-0.17,-0.01), Personal Living (PL; B=-0.09, SE=0.05, CI:-0.19,-0.01), and Community Living (CL; B=-0.09, SE=0.04, CI:-0.19,-0.01). The indirect effect of ED on SC and CL was significant; the indirect effect of Apathy was not significant.

Conclusions: More complex tumor treatment and sequelae was associated with poorer long-term AF via increased ED and apathy. Cognitive rehabilitation programs may focus on the role of executive function and initiation that contribute to AF, particularly SC and CL skills, to help survivors achieve comparable levels of independence in everyday function as their peers.

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D. GRIFFIN, K. TIPLADY, A. DEL CASTILLO, C. BERGER, M.T. ACOSTA & K.K. HARDY. Clinic-Based Neuropsychological Screening in Children with Neurofibromatosis Type 1.

Objective: Children with neurofibromatosis type 1 (NF1) experience an elevated incidence of learning difficulties, ADHD, and autism spectrum disorders. Neuropsychological evaluations are often recommended by medical providers, yet it is unclear how many children with NF1 receive neuropsychological services, or how to screen patients to triage those needing assessment. This study examined differences in parent-reported attention, executive functioning (EF), and psychosocial functioning between children who did and did not receive evaluations.

Participants and Methods: Families of children receiving routine care in a NF1 clinic were given screening questionnaires to inform providers about potential areas of cognitive and psychosocial weakness. Questionnaires included the Behavior Rating Inventory of Executive Function (BRIEF), Child Behavior Checklist, Social Responsiveness Scale (SRS), and Vanderbilt ADHD Diagnostic Scale. Evaluation was recommended for all patients, and data about completion and timing of assessments was abstracted from medical records.

Results: Of the children with completed questionnaires (N=49, 46.9% male, mean age=10.4 years), 33 (67.3%) were assessed before (n=11) or after completion (n=22), while 16 (32.7%) were never evaluated. Children receiving evaluations before or after screening completion exhibited significantly greater parent ratings of children's inattention (p<.05) and global EF (p<.05) compared to those who were not evaluated. However, groups did not differ on socialization and mood. The majority of children with elevated symptoms of inattention and/or hyperactivity (≥6 on either scale), EF difficulties (≥60 on the BRIEF GEC), or social problems (≥60 on the SRS Total) were assessed (82.2%, 76.5%, and 73.3%, respectively).

Conclusions: Neuropsychological screening in a NF1 medical clinic seems to identify the majority of children with attention, EF, and social difficulties who may benefit from neuropsychological evaluation, suggesting screening in a primary care setting may be beneficial.

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K. HALVERSON, A. OCHOA, K. MACDONALD, W. LACEY, J. CASTILLO, K. OSTERMAIER & P.T. CIRINO. Neurocognitive and Mathematical Profiles of Spina Bifida Myelomeningocele and Math Disability.

Objective: Spina bifida myelomeningocele (SBM) is associated with a high incidence of math difficulties (MD) in the context of a variable cognitive profile (English et al., 2009). Correlates of math are well known, but it is unclear how children with SBM and MD compare to those with MD but without SBM, both mathematically and on neurocognitive measures. It is hypothesized that both academic and cognitive measures of math will be impaired across groups. Given its relation to mathematical ability (Raghubar et al., 2010), we also expect working memory performance to be low across groups.

Participants and Methods: Neurocognitive and achievement profiles of children with SBM+MD (n=10) and children with MD (n=22) in grades 2 and 3 were evaluated for level and compared. MD was based on standardized measures (KTEA-3) of computations and applications (< 25th %ile). Participants also completed a range of other math measures (e.g., math fluency, story problems), reading (decoding and fluency), math cognition (e.g., number line estimation, symbolic and nonsymbolic comparison), and neurocognitive performance (vocabulary, verbal fluency, nonverbal reasoning, shifting, inhibition and working memory). ANOVA was used to compare groups.

Results: Both groups demonstrated largely below age expected performance across measures of math and neurocognition, with math reasoning, fluency and problem solving being most impaired across groups. The SBM+MD group displayed significantly weaker performance on tasks of non-verbal reasoning, working memory and non-symbolic comparison accuracy (p < .05) but no significant differences were found on any of the eight math measures or four reading measures.

Conclusions: These findings highlight that children with SBM+MD have challenges largely similar in nature and severity to those with MD, with added impairments in working memory, nonverbal reasoning and math cognition.

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M. HARCIAREK, A. MANKOWSKA, B. BIEDUNKIEWICZ, A. DEBSKA-SLIZIEN & K.M. HEILMAN. Leftward Attentional Bias in Dialyzed Patients with End-Stage Renal Disease: A Sign of Increased Right Parietal Activation or a Problem with Left-Sided Disengagement?

Objective: Dialyzed patients with end-stage renal disease typically present with attentional problems that include their inability to correctly allocate spatial attention. Specifically, in comparison to healthy controls, dialyzed patients have an increased leftward attentional bias. It is not clear, however, whether this bias is related to the activation of the right parietal lobe with an increase of attention toward left hemispace or

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dysfunction of right frontal mediated disengagement from left sided stimuli. This study tested these alternative hypotheses.
Participants and Methods: Participants were 19 non-demented dialyzed patients with end-stage renal disease and 21 demographically matched healthy controls. To test for global spatial attentional engagement, participants attempted to bisect a series of horizontal lines composed of 2 segments of unequal length, with the larger segment placed to the right or left. To test for focal attentional disengagement, participants were asked to bisect the longer segment of these lines.
Results: For the global condition, there were no group differences. In the focal condition, when the shorter segment was on the left or right sides, both groups deviated their bisections toward the shorter segment. However, the healthy controls deviated their bisection significantly more rightwards then did the patients.
Conclusions: If there was a left-sided attention bias, when the shorter segment was to the left, dialyzed patients should have deviated to the left more than the controls and they did not. Thus, the dialyzed patients' decreased deviation when the shorter segment was to the right, and the lack of group differences in the global condition (where there is no need to disengage from a portion of the stimulus) provide support for the left-sided disengagement hypothesis, most likely related to right hemispheric frontal-subcortical dysfunction.
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M.F. JAY, R.B. TANGEN, J. PARK & A. SHAHID. Association of Emotional and Behavioral Symptoms with Cognitive and Adaptive Functioning in Children with Intractable Epilepsy.
Objective: Children with intractable epilepsy are at risk for emotional and behavioral problems. These problems are under-assessed and their impact on adaptive functioning is not well understood. This study examined children with intractable epilepsy and assessed rate and type of emotional/behavioral symptoms. Second, differences in cognitive and adaptive skills in children with and without emotional/behavioral symptoms were examined. It was hypothesized that children with emotional/behavioral symptoms would have poorer adaptive and executive functioning and lower IQ than children without emotional/behavior symptoms.
Participants and Methods: Forty-one children ages 6-18 years with intractable epilepsy underwent pre-surgical neuropsychological testing (Mean Age= 12 years; 58.5% female). Cognitive, emotional/behavioral, and adaptive functioning measures were administered including the Wechsler Intelligence Scales, Vineland Adaptive Behavior Rating Scales, and the Child Behavior Checklist (CBCL).
Results: Forty-six percent of the sample was rated as having at least one CBCL syndrome scale in the borderline clinical range. The most commonly endorsed symptoms included Attention Problems (33%), Withdrawn/Depressed (28%), and Thought Problems (28%). The group with emotional/behavioral symptoms had significantly lower adaptive functioning than the group without symptoms ($F(1, 34) = 9.82$, $p = .00$). There was no significant difference in Full Scale IQ between the groups, but the group with emotional/behavioral symptoms had lower working memory ($F(1, 37) = 3.83$, $p = .05$) and processing speed ($F(1, 37) = 4.03$, $p = .05$).
Conclusions: Children with intractable epilepsy have high rates of emotional/behavioral problems. Contrary to prediction, children with and without behavioral problems did not differ in intelligence, but as predicted, they differed in executive functioning skills. Emotional/behavioral symptoms were also associated with poorer adaptive functioning. Ongoing efforts for assessment and intervention are needed.
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L.A. KAIS, N. MILLER, E. MCCOY, J.B. EISENGART, M.K. GEORGIEFF, T.C. LUND, W.P. MILLER, P.J. ORCHARD & R. PIERPONT. Use of EEG and Behavioral Measures for Early Detection of Childhood-Onset Cerebral Adrenoleukodystrophy: A Feasibility Study.
Objective: The cerebral form of adrenoleukodystrophy (cALD) is a devastating, demyelinating neurodegenerative disease that emerges in childhood. To facilitate earlier intervention and ultimately superior outcomes, there is an urgent need to identify more sensitive and cost-effective methods of disease detection. The objective of this pilot study was to evaluate the feasibility of electroencephalography (EEG) measures in conjunction with behavioral tasks to enable earlier detection of cerebral disease onset in pediatric patients with X-linked ALD.
Participants and Methods: We present results from 13 boys with cALD and 9 healthy controls (4 – 12 years old). EEG (Visual Evoked Potential, VEP; Interhemispheric Transfer Task, IHTT) and behavioral data (NIHToolbox Processing Speed/Flanker Tasks; visual motor tasks) were collected.
Results: Pilot data indicated good feasibility and tolerability of the research protocol. Poorer performance on behavioral tasks was associated with greater presence of white matter disease. Analysis of VEP P100 latency for 9 patients with early-stage cALD in comparison to age-matched controls indicated mean latencies that were significantly more variable in the cALD group (M=152.4 ms, SD=26.9) than the control group (M=136.2 ms, SD=10.8), with a group effect in the expected direction indicating slower latencies in the cALD group (mean difference = 16.2 ms, 95% CI: -4.2 to 36.7). Preliminary analysis of the IHTT revealed atypical results (e.g., high rate of non-responses, variable relationship between ipsilateral and contralateral conditions) compared to prior studies, suggesting that it may not be an ideal measure for this population/age-group.
Conclusions: Standard clinical neuropsychological tools have not shown sufficient sensitivity to the earliest stages of cALD disease. The current study indicates that EEG, an approach potentially less amenable to compensation for neural degeneration in cALD, is a feasible and tolerable method for investigating early disease onset.
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R.J. KAUTIAINEN & T. KING. Corpus Callosum White Matter Integrity Associated with Adaptive Functioning Outcomes of Long-Term Survivors of Pediatric Brain Tumors.
Objective: Lower white matter integrity, as measured by fractional anisotropy (FA), is associated with adaptive functioning (AF) outcomes in a variety of neurological diseases. Survivors of childhood brain tumors have difficulties with AF, but FA has not been investigated as a neurological mechanism underlying AF deficits. We aim to assess the relationship of corpus callosum (CC) FA and AF across survivors of high grade (HG) tumors, low grade (LG) tumors, and healthy controls. We predict that the relationship between CC FA and AF is significantly different between groups, with a relationship difference of the largest magnitude between HG survivors and controls.
Participants and Methods: 12 HG and 16 LG survivors (M_{age}=22.8±4.4) and 28 age and sex-matched controls (M_{age}=22.1±5.7) underwent MRI and informants were interviewed with the Scales of Independent Behavior-Revised (SIB-R), a measure of AF. Diffusion image processing was completed in FMRIB's Diffusion Toolbox and the CC was divided into CC1-CC5. Correlations, Fisher's Z-Test and Chi-Square analyses were performed.
Results: CC3 FA was significantly related to Personal Living (r=-.59), Social Communication (r=-.60) and Community Living (r=-.64) in HG survivors. LG survivors had no significant correlations. CC3 FA for controls was significantly associated with Community Living (r=.39). HG survivors have a significantly different relationship than controls for scales of Broad Independent Living Skills (BILS; p=.01), Personal Living (p=.01), Social Communication (p=.004) and Community

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Living (p=.001). HG survivors had significantly more impairment in BILS than controls (p=.03) while LG survivors did not differ from controls or HG survivors.
Conclusions: HG survivors demonstrate a greater frequency of impairment in overall AF and have significantly different relationships between FA and AF than their healthy peers or LG survivors. Future work should utilize additional measurements to illuminate the nuanced cognitive deficits contributing to LG variability in FA and AF.
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A.C. KIRSCH, M. ZACCARIELLO, T. BROWN, U. BITE & S. MARDINI. Patterns of Neuropsychological Functioning Across Craniofacial Abnormalities.
Objective: Craniofacial abnormalities encompass a variety of abnormal skull formations, genetic syndromes associated with facial dysmorphism, and non-syndromic cleft lip/palate. Limited research focused primarily on the cleft lip/palate population and utilizing small samples has suggested greater risk for language, verbal skills, learning, and memory development. This study examines neuropsychological functioning in the broader craniofacial population.
Participants and Methods: Participants (N=144, 56% Male, M_{age}=7.94, Range=1-26 years) included patients referred for neuropsychological screening through a multi-disciplinary craniofacial clinic with a variety of conditions (e.g., cleft lip/palate, Apert Syndrome, craniosynostosis). Composites were computed for domains of intellectual functioning, academic achievement, attention, executive function, and memory. Impairment was defined at 1.5SD below the mean.
Results: Mean IQ fell within the average range (M=95.95), with 12% falling below 1.5SD. The following rates of impairment were identified in word reading (16%, M=96.33), reading fluency (33%, M=81.93), reading comprehension (20%, M=87.87), math calculation (16%, M=92.89), math problem solving (21%, M=93.87), and spelling (11%, M=94.53). 10% had visual spatial skills below 1.5SD (M=93.65). Motor skills (M=84.80) fell below average, with 26% demonstrating impairment. On memory measures, 17% demonstrated difficulties with learning (M=94.95); Greater impairment in recall and recognition was not observed (7%, M=93.37-98.68). 12% demonstrated executive function difficulties (M=94.28). 12% and 30% demonstrated weaknesses on visual (M=93.29) and auditory attention tasks (M=91.53), respectively.
Conclusions: Results indicate that patients with craniofacial abnormalities are at greater risk for impairments, most notably in academic achievement, motor skills, and auditory attention. This supports the need for neuropsychology in craniofacial care. Future research should better characterize individual patterns between diagnoses.
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K. LEE, B. YUND, G. SCHWARZ, D. GLAD & B.P. KLEIN-TASMAN. Longitudinal Examination of Problem Behaviors in Children with Neurofibromatosis type 1.
Objective: Previous studies of problem behaviors in children with neurofibromatosis type 1 (NF1) have suggested similar scores on measures of problem behavior in preschool-aged children, but higher levels of problem behaviors in school-aged children when compared to typically developing children. Currently, there are no studies examining problems behaviors in children with NF1 over time. Thus, the aim of this study is to describe the development of problem behaviors in children with NF1.
Participants and Methods: Parents of 20 children with NF1 (ll boys/9 girls) completed the Behavior Assessment System for Children, Second Edition (BASC-2) to assess problem behaviors at 2 time periods: ages 3-5 (T1) and ages 9-11 (T2).
Results: Children with NF1 had more Hyperactivity problems at T2 (Mdn = 48.50) than T1 (Mdn = 46.00), with a statistically significant increase in the median (Exact Sign Test; Mdn = 5.00, p = 0.012). Significant Spearman's rank-order correlations between T1 and T2 were found for the Behavioral Symptoms Index (r(18) = .482, p = .031), Hyperactivity (r(18) = .532, p = .016), and Atypicality (r(18) = .517, p = .019). The proportion of children with scores in the at-risk/elevated range was not significantly different between the two time points for any of the BASC-2 scales (exact McNemar's test p > .05).
Conclusions: Findings from this longitudinal study suggest that problem behaviors do not increase over time with the exception of hyperactivity problems, which should be monitored as children with NF1 develop. While overall levels of problem behaviors were correlated from the preschool to school-aged years, relations at the individual scale level were sparse and most evident for Hyperactivity and Atypicality scales. The implications of the findings will be discussed.
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D.M. OHNEMUS, K. NEIGHBORS, L. SORENSEN, J. LAI & E. ALONSO. A Pilot Study of Potential Screening Tools for Pediatric Minimal Hepatic Encephalopathy.
Objective: Despite the need for clinical monitoring of minimal hepatic encephalopathy (MHE) in pediatric liver disease, no reliable screening tools for children exist. This pilot study aims to determine the feasibility and sensitivity of various neurocognitive tests, surveys, and item banks, and explore their relationship to clinical indicators of portal hypertension.
Participants and Methods: Children with portal hypertension were recruited from Ann & Robert H. Lurie Children's Hospital of Chicago Liver Clinic. Participants completed a neuropsychological battery (Conners Continuous Performance Test, D-KEFS Trail Making and Color-Word Interference, Grooved Pegboard). Parents and patients also completed surveys of cognitive functioning and health-related quality of life {PROMIS Pediatric Cognitive Function (PedsPCF) item bank, Behavior Rating Inventory of Executive Function (BRIEF), PROMIS Pediatric-25 Profile}.
Results: All participants (N=14, age 8 to 17) completed at least 90% of the battery within 2 hours. Results suggest the BRIEF and Grooved Pegboard may be the most sensitive indicators of MHE as evidenced by qualitative heatmap analysis of the relationship between z-scores and clinical signs of portal hypertension (lab values, reported learning and/or sleep problems, MHE symptoms). However, Parent PedsPCF Z-scores ≤ 1 tended to also score poorly on BRIEF and Grooved Pegboard. While cost and time constraints make the BRIEF more challenging to use in the clinic, the format and accessibility of PedsPCF Short Form and Computerized Adaptive Testing may be more practical.
Conclusions: The battery shows promise in terms of feasibility and sensitivity in this small pilot sample of children with portal hypertension. The PedsPCF Short Form in conjunction with the Grooved Pegboard may hold the most promise in terms of sensitivity and feasibility for screening in the clinical setting. Further study will examine this question in more depth in a larger multi-center sample.
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D. OSTOJIC, R. WESTMACOTT & T. WILLIAMS. Parent Reported Behavioral Concerns in a Sample of Pediatric Patients with Moyamoya Vasculopathy.
Objective: Moyamoya vasculopathy is a cerebrovascular condition marked by progressive narrowing of the distal internal carotid arteries and abnormal vascular collaterals. Children and adolescents with moyamoya are at increased risk for neurological and cognitive

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sequela, but little is known about their psychosocial functioning. The present study is the first to examine the prevalence of elevated levels of emotional and behavioral problems in a sample of children and adolescents with moyamoya vasculopathy.
Participants and Methods: The study was a retrospective chart review of thirty pediatric moyamoya patients (M_{age} = 10 years 3 months, SD = 4 years, 46.7% male) seen between 2002 and 2018 at a major tertiary pediatric center. Only information from participants who had a pre-surgical neuropsychological assessment was included. Problem behaviours were assessed using caregiver-report on the Behavior Assessment System for Children, 2nd Edition. Logistic regression analyses were conducted to examine if demographic and disease specific variables predicted problem endorsement.
Results: According to caregivers, children with moyamoya vasculopathy present with elevated symptoms (T score ≥ 60) spanning across a range of psychosocial areas, including somatization (43%), attention (33%) and depression (30%). Proxy of disease severity (i.e., planned revascularization surgery) was found to significantly predict likelihood of having elevated levels of somatic symptoms. Ratings on other scales were not associated with any of the predictors.
Conclusions: Pediatric moyamoya patients are at risk for socioemotional and behavioral problems at rates comparable to those reported for other medically complex pediatric samples. The findings highlight the need for clinicians to screen for psychosocial problems in this clinical population and for future studies to explore the potential impact upon quality of life.
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I. REIFE, A. HOOD & K. WILLS. The Effect of Oxygen Saturation on Executive Functioning in Children with Sickle Cell Disease.
Objective: Sickle cell disease (SCD) is a genetic disorder characterized by the production of abnormal hemoglobin. SCD is known to result in cognitive deficits, particularly in executive functioning, as well as lower oxygen saturation levels. Our goal was to determine whether oxygen saturation levels predicted executive functioning in children with SCD.
Participants and Methods: This retrospective study used a subset of cognitive and pulmonary data (n= 83) from a larger study conducted at Children's Minnesota between 2007 and 2011, which aimed to investigate the prognostic utility of neuropsychological screening tests for children with SCD. At the date of testing, children ranged from age 4 through age 18 (M = 10.11, SD = 3.7). Children completed a two-hour battery of tests, of which the Sentence Repetition test (WRAML-2), Word Generation (NEPSY-2), and Coding (WISC-IV) subtests were assessed for the current study. Medical chart review yielded additional information including type of SCD and severity, MRI status, medication usage (hydroxyurea), and oxygen saturation levels, which were averages from hospital visits a year before through a year after testing and (M = 96.03, SD = range = 3.5).
Results: We conducted a linear regression and found that averaged oxygen saturation levels approached significance in predicting working memory (Sentence Repetition) $F(3, 36) = 1.58$, $p = .07$, $r^2 = .04$, and verbal fluency (semantic word generation) $F(3, 35) = 2.28$, $p = .07$, $r^2 = .09$ after controlling for hydroxyurea usage and stroke status in children with HbSS SCD.
Conclusions: Our findings demonstrate that for children with HbSS SCD (the most severe form of the disease), oxygen saturation may be an indicator of poorer executive functioning. More work is needed in larger samples, but our research demonstrates that consistently lower oxygen saturation levels may suggest to medical providers that a child has poorer executive functioning and a neuropsychological evaluation may be appropriate.
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H.L. SCHNEIDER, F. PINARD, D.P. WABER & M. GORMAN. Neurocognitive and Educational Outcomes in Children with Multiphasic Opsoclonus-Myoclonus-Ataxia Syndrome (OMS).
Objective: Opsoclonus-myoclonus-ataxia syndrome (OMS) is a rare, but severe neurological disorder with typical onset during the toddler period. It carries risk for significant neurological, behavioral, or cognitive sequelae. Although ~ 75% of patients will present with a chronic relapsing course, few studies have examined neuropsychological and educational outcomes in these children. This pilot study sought to document these outcomes in school-age children with a history of multiphasic OMS.
Participants and Methods: Ten children diagnosed with multiphasic OMS (age at onset, median=20 months, range 11 to 98 months; age at testing, median=11.79 years, range 6 to 16 years) who had completed neuropsychological assessment were identified from a clinical database. Of these, 90% had normal development prior to OMS diagnosis and 80% presented with a tumor. IQ and educational outcomes were abstracted from the record.
Results: The median Wechsler Full Scale IQ was 73 (range 44-93); only half of patients had intellectual abilities in the normal range. Median scores are reported below. Among the cognitive domains, verbal ability was a relative strength (VCI=82, range 59-100), with 80% of children achieving scores in the Low Average to Average range. Nonverbal reasoning (PRI), working memory (WMI), and processing speed (PSI) were more impaired, with 40-50% of scores falling in the Low Average to Average range (PRI= 79.5, range 45-100; WMI=78.5, range 62-104; PSI=73, range 50-85). Regarding educational outcomes, 60% attended a mainstream school with special education support, 20% attended a specialized school, and educational placement was unknown for 20%.
Conclusions: This pilot study documented significant neurocognitive impairment and reduced educational outcomes in children with multiphasic OMS, albeit with considerable variability. Therefore, understanding neuropsychological and educational outcomes is crucial in assisting in counseling families and obtaining appropriate school programs.
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E. SEMMEL, S. NA & T. KING. Executive Functioning Partially Explains the Relationship Between Brain Network Characteristics and Adaptive Functioning in Pediatric Brain Tumor Survivors.
Objective: Research has found altered brain network connectivity in pediatric brain tumor survivors (PBTS). Efficient brain networks are critical for integrating cognitive skills to perform complex behaviors such as adaptive functioning (AF). The present study explored relationships between structural brain network characteristics and AF in PBTS. We examined whether this relationship is mediated by executive functioning (EF), which is necessary for AF and often impaired in PBTS.
Participants and Methods: 50 adolescent and young adult PBTS (mean age=22, SD=5.5) underwent neuropsychological assessment and MRI. Informants completed the SIB-R interview of AF. Letter-Number Sequencing from the D-KEFS was used as a measure of EF. Deterministic tractography was conducted on DTI, and global efficiency (GE) and average clustering coefficient (CC), descriptors of network organization, were computed via graph analysis. Nodes were defined using the Automated Anatomical Labeling Atlas, and edges were defined as the average FA of all streamlines linking two nodes. Correlations and analysis of indirect effects controlling for visual scanning speed were conducted.
Results: There was a significant relationship between average CC (but not GE) and the SIB-R Broad Independent Living scale (r=.506). Furthermore, there were significant relationships between EF and both average CC (r=.306) and AF(r=.362) while controlling for visual scanning speed. Finally, there was a significant indirect effect of average CC on AF through EF while controlling for visual scanning speed (b=.101, CI: .003-.253).

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Conclusions: Based on these findings, it appears that higher levels of brain network segregation, as measured by average CC, facilitates EF in PBTS, which allows individuals to more competently engage in adaptive behaviors. Future work should investigate tumor location and treatment factors as potential moderators of the relationships found in this study to better understand specific risk factors in this group.

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J. THOMPSON, B.D. ESCHLER & S.D. GALE. Behavioral, Emotional, and Social Outcome in Individuals with Childhood Extracorporeal Membrane Oxygenation: A Case Series.

Objective: To examine behavioral, emotional, and social outcome in adolescents and young adults who underwent extracorporeal membrane oxygenation (ECMO) as children due to acute illness.

Participants and Methods: Eight participants (three male, five female; ages 11-22) at least 1 year post-ECMO procedure (M=5.6 years; SD=2.1) for acute respiratory or cardiac illness were assessed using the self-report form and, when appropriate, parent report form of the BRIEF, BASC-2, and SSIS. Scores were compared to normative data for age to investigate potential impairment in multiple areas of behavioral, emotional, and social functioning.

Results: Scores on objective measures of emotional, behavioral, and social functioning were variable across participants and between self- and parent report. Very few difficulties with inattention, behavioral problems, and internalizing symptoms were reported by participants, while parent report revealed a slightly higher occurrence of difficulties in these areas. On the SSIS, the student- and parent report tended to be contradictory, as students were more likely to perceive their social skills to be quite high and problem behaviors low, while their parents endorsed the opposite: higher rates of problem behaviors and lower social skill abilities.

Conclusions: Children and adolescents who receive ECMO treatment may have long-lasting difficulties with attentional and behavioral problems, social skills, and emotional regulation, but may have limited insight into the severity of these difficulties. Parents and caregivers tend to report more symptoms and may be identifying more functional difficulties in daily life, becoming important contributors to the overall picture of neuropsychological assessment.

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K. TIPLADY, D. GRIFFIN, A. DEL CASTILLO, C. BERGER, A. ARMOUR, L. KENWORTHY, M.T. ACOSTA & K.K. HARDY. Inattentive Symptoms Predict Autism Characteristics in Children with Neurofibromatosis Type 1.

Objective: Children with Neurofibromatosis Type 1 (NF1) have increased risk for Attention Deficit Hyperactive Disorder (ADHD) and Autism Spectrum Disorder (ASD), but there is little information on how symptoms of each manifest in this population. The purpose of this study is to understand how ADHD symptoms predict socialization difficulties in children with NF1 as compared to children with ASD.

Participants and Methods: Parents of children with NF1 (n=45) and children with ASD (n=135) completed the Social Responsiveness Scale (SRS) and DSM-symptom ratings of ADHD. Correlation and regression analyses were performed to examine how inattentive (IN) and hyperactive (HI) symptoms predict socialization deficits and restricted interests/repetitive behaviors (RRB) in each group.

Results: On average, parents of children with NF1 report fewer SRS socialization concerns (M=58.0) than parents of children with ASD (M=70.7). In children with NF1, parents report a greater number of HI (M=2.61) than IN symptoms (M=1.93), while parents of children with ASD report the reverse pattern (IN=4.67;HI= 3.22). HI and IN symptoms are more strongly correlated with RRB in NF1 than ASD (r=.70;r=.55). For those with NF1, HI symptoms are predictive of higher RRB (β=.56;p>.004), social cognition (β=.47;p>.017), and socialization (β=.41; p>.038) difficulties. In contrast, IN symptoms predict higher RRB (β=.45;p>.000), social cognition (β=.39;p>.000), and socialization (β=.45;p>.000) difficulties in ASD.

Conclusions: Approximately 40% of children with NF1 have a diagnosis of ADHD while a similar or higher proportion of children with ASD have ADHD. Elevated rates of ASD in the NF1 population are reported based on difficulties with socialization and the presence of RRB. Results of this study suggest the comorbidity between ADHD and NF1 may contribute to deficits in socialization that are characteristic of ASD. In addition, IN symptoms predict RRB in NF1, raising the question of whether common ASD screening tools are sensitive and specific for the NF1 population.

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T. VARGO, T.C. LUND, A. GUPTA, P.J. ORCHARD, E. BRAUNLIN, K. KING & J.B. EISENGART. Model for Newborn Screening: Short-Term Treatment Outcomes for Children Identified with Hurler Syndrome at Birth.

Objective: Hurler syndrome (HS) is a rare inherited lysosomal storage disorder that, untreated, results in rapid neurocognitive decline after 2 years, multisystem dysfunction, and death before 10 years. Earlier treatment with hematopoietic cell transplantation (HCT), in combination with enzyme replacement therapy (ERT), is associated with better physical and neurocognitive outcomes. As such, HS was added to the Recommended Uniform Screening Panel for newborn screening in 2016. While too soon to assess the impact of early identification and treatment, this case series examines neurocognitive and adaptive functioning in three children with HS identified at birth due to an older affected sibling.

Participants and Methods: Three children (Patients A, B, and C) diagnosed with HS at < 1 month of life underwent early initiation of ERT (at 28, 28, and 7 days, respectively) and HCT (at 8.9 months, 5.0 months, and 4.9 months, respectively). We compare pre-HCT IQ and adaptive functioning to that at most recent follow-up.

Results: Upon first evaluation at 3-7 months, all three patients demonstrated average IQ (A=105, B=96, and C=105). At most recent follow-up (6, 5, and 2 years, respectively), all patients maintained average IQs (IQ point change: +0, -3, -5, respectively). Prior to HCT, Patients A and C showed average overall adaptive functioning; Patient B was below average. At most recent follow-up, all three patients were average in overall adaptive functioning and for all subdomains.

Conclusions: Maintenance of IQ and adaptive functioning in these infants, identified and treated with ERT at < 1 month old and by HCT at < 9 months old differs from published data in children who started identical treatment at a later age and deteriorated to less than average before stabilization following HCT. This case series provides quantitative evidence for newborn screening and early treatment as key to positive neurocognitive and functional outcomes.

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E. WESONGA, A. KING & D. WHITE. Executive Abilities and Academic Achievement in Children with Sickle Cell Disease.

Objective: In children with sickle cell disease (SCD), a genetic disorder resulting in abnormal hemoglobin and significant neurologic sequelae, poor academic outcomes are common. The present study was designed to investigate relationships among *executive performance* (assessed using a composite of performance-based measures), *executive behavior* in daily life (assessed using parent ratings), and *academic achievement* (assessed using performance-based measures) in children with SCD.

Participants and Methods: Data was collected as part of a longitudinal study of neuropsychological performance in children with SCD.

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Participants were 38 children with SCD aged 7-16 years (M = 11.8, SD = 2.8) who participated in neuropsychological testing at baseline and 2-year follow-up. Nearly half of the sample was diagnosed with the most severe variant of SCD, *Hb SS* (47.4%), and nearly all (94.7%) had normal-appearing MRI. Neuropsychological test battery included measures of executive performance (CPT-2, selected D-KEFS subtests), executive behavior (BRIEF Parent Report), and reading and math achievement (selected WJ-III subtests).

Results: Results indicated a significant, positive relationship between baseline executive performance and executive behavior, and these two measures were simultaneously associated with concurrent reading and math achievement. Of note, executive performance did not explain variance in academic achievement above and beyond executive behavior. Neither baseline executive performance nor executive behavior predicted follow-up academic achievement. Executive performance, executive behavior, and academic achievement generally remained stable over 2-year follow-up.

Conclusions: Our findings suggest that measures of executive behavior should not be overlooked in the context of pediatric SCD. Additional investigation of potential screening tools for academic outcomes in this population is warranted.

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K.R. WOLFE, J. BRINTON, M. DI MARIA, M. MEIER & D. LIPTZIN. Oxygen Saturations and Neurodevelopmental Outcomes in Single Ventricle Congenital Heart Disease: A Secondary Database Analysis of Pediatric Heart Network Trials.

Objective: To evaluate whether the degree of hypoxemia following stage-I and stage-II palliative surgeries predicts neurodevelopmental outcomes at 14 months of age in children with single ventricle congenital heart disease (SVCHD).

Participants and Methods: We analyzed longitudinal data from two Pediatric Heart Network (PHN) randomized controlled trials, with a total of 328 subjects. Oxygen saturations, measured via pulse oximetry, at time of discharge from stage-I and stage-II surgeries were the primary predictors of interest, and Bayley Scales of Infant Development-II (BSID-II) scores at 14 months old were the primary outcome measure. Relevant covariates were also included in regression models.

Results: Oxygen saturations at time of discharge from stage-I and stage-II surgeries were not related to BSID-II scores. Having one or more oxygen saturation measurements below 80% was also not associated with BSID-II scores, and neither was change in oxygen saturations over time. These relationships were not altered by inclusion of relevant covariates.

Conclusions: In this cohort of children with SVCHD, oxygen saturations post-stage-I and post-stage-II palliation surgeries as measured via pulse oximetry were not associated with neurodevelopmental outcomes at 14 months of age. The relationship between oxygen saturations and neurodevelopment in SVCHD is likely complex, and neurodevelopment is known to be affected by a number of factors. Pulse oximetry may also be an insufficient proxy for cerebral oxygen delivery. Clinically, pulse oximetry readings during the interstage and post-stage-II surgery periods are not a reliable predictor of future neurodevelopmental risk.

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B. YUND, K. LEE, C. CASNAR & B.P. KLEIN-TASMAN. The Impact of Sleep Problems on Executive Functioning in School-Aged Children with NF1.

Objective: Executive functioning (EF) impairment is common in neurofibromatosis type 1 (NF1); however, there is a relative lack of literature examining potential factors that could contribute to EF impairment in children with NF1. This study examines whether the presence of sleep problems in school-aged children with NF1 incurs greater risk for EF deficits on both lab-based and functional parent and teacher-reported measures.

Participants and Methods: Participants were 40 children with NF1 (ages 9-13), 40 parents, and 30 teachers. Children were administered the NIH Toolbox List Sorting Working Memory (LSWM), Dimensional Change Card Sort Test (DCCS), Flanker Inhibitory Control and Attention Test (Flanker), Cogstate Identification (IDN), One Card Learning (OCL), One Back (ONB). Parents and teachers completed the Behavior Rating Inventory of Executive Function (BRIEF). The Pediatric Sleep Questionnaire (PSQ) was completed by parents and the Sleep-Related Breathing Disorder (SDB) subscale was examined.

Results: Fourteen children (35%) met criteria for SDB. Significant differences in performance between children with/without SDB were apparent on LSWM, $t(36) = 2.12$, $p = .04$, OCL reaction time, $t(39) = 2.11$, $p = .04$, and ONB reaction time, $t(39) = 2.08$, $p = .04$. No significant differences were evident on other lab-based measures. Significant differences between children with/without SDB were evident on parent EF measures (BRIEF, $t(39) = 3.07$, $p = .004$), but not on teacher EF measures. However, children's average sleep time per night was significantly related to teacher report of emotional control (BRIEF, $rho = -.484$, $p = .01$).

Conclusions: SDB was commonly reported in our sample of school-aged children with NF1. Children with NF1 and SDB were more likely to demonstrate slower reaction times on lab-based working memory tasks and were more likely to demonstrate functional EF impairments based on parent report. Results highlight the importance of screening for SDB, particularly in children and adolescents vulnerable to EF impairments.

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Multiple Sclerosis/ALS/Demyelinating Disorders

C. HAGUE, L. HARDER, C. WANG, B. GREENBERG & A. WILKINSON-SMITH. Comparing Quality of Life in Pediatric Anti-NMDA Receptor Encephalitis and Acute Disseminated Encephalomyelitis (ADEM).

Objective: Anti-NMDA receptor encephalitis (ANMDARE) is a rare, monophasic condition that results from an autoimmune attack of the brain's NMDA receptors. Similarly, acute disseminated encephalomyelitis (ADEM) is a rare, monophasic condition, thought to result from an autoimmune attack of the myelin of the central nervous system. Research on outcomes in children with ADEM and ANMDARE is limited, but recent findings suggest that pediatric patients may experience neuropsychological deficits (e.g., Titulaer et al. 2018, Burton et al. 2017). The present study investigated differences in parent-reported quality of life in children with ADEM and ANMDARE.

Participants and Methods: There were no significant differences between groups on age, sex, ethnicity, or handedness. Parents of 14 participants with ANMDARE (mean age=9.79) and 14 participants with ADEM (mean age=7.71) completed the Pediatric Quality of Life Inventory (PedsQL) during routine follow-up care. An independent-samples t-test compared parent-reported PedsQL ratings.

Results: Independent samples t-tests revealed statistically significant differences ($p<.05$) for physical and social quality of life domains between groups. Specifically, children with ANMDARE were rated as experiencing more physical (mean=77.21) and social problems (mean=75.07) than children with ADEM (physical mean=94.79; social mean=89.71). Groups did not demonstrate significant differences related to emotional or school functioning.

Conclusions: Despite both being monophasic autoimmune conditions, current results suggest that children with ANMDARE are at increased risk for physical and social quality of life problems as compared to

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children with ADEM. Mean social functioning for children with ANMDARE fell into the mildly impaired range and mean physical and school functioning were below average. These findings support the need for consistent monitoring quality of life in patients with autoimmune disease, especially ANMDARE.

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Neurostimulation/Neuromodulation

P. BHAVSAR, J. JIMENEZ-SHAHED, A. VISWANATHAN & A. STRUTT. Cognition and Psychological Symptomology in Tourette's Syndrome following Deep Brain Stimulation.

Objective: Tourette syndrome (TS) is a neurodevelopmental condition that presents with motor and phonic tics, and affects the cortico-strio-thalamo-cortical circuit with ADD/ADHD and OCD as the most common comorbidities, respectively. The application of deep brain stimulation (DBS) to neurodevelopmental conditions including medically refractory TS is expanding. Research on cognition and mood post TS-DBS is limited.

Participants and Methods: This study analyzed the neuropsychological and psychological outcomes of a 4–case series, 2-10 years post bilateral globus pallidus internus DBS. Comprehensive neuropsychological assessment included self-report measures of mood, quality of life, and behavioral tendencies including obsessions and compulsions and frontal lobe mediated skills associated with ADD/ADHD.

Results: Cognitive profiles revealed impairments in frontal-subcortical mediated functions pre-DBS with subtle fluctuations over time post-DBS. Subjective perceptions of quality of life and anxiety waxed and waned. Comorbid obsessive-compulsive symptoms fluctuated between mild and moderate on the Yale-Brown Obsessive Compulsive Scale. Symptoms of depression improved in general, with the greatest improvement seen in those with more severe preoperative depression on the Beck Depression Inventory-second edition. Subtle cognitive improvements were noted with amelioration of psychological distress.

Conclusions: We conclude that bilateral globus pallidus internus DBS for medically refractory TS reduces tic severity without significant neuropsychological morbidity. The reduction of TS symptoms allows practitioners the opportunity to focus on the significant mood problems which can occur secondary to a history of medically refractory TS and the psychosocial stressors associated with this condition. Psychological interventions and recommendations will be provided, highlighting the need for psychological assessment in conjunction with cognitive evaluations for this population.

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Other

S. GOLDSTEIN, A.D. STAPLES, A. FLORES, C. SWICK, R. REED, J. BROOKS, A. LUKOMSKI, A. HUTH-BOCKS & R. LAJINESS-O'NEILL. Maternal Anxiety and Sleep Predict Greater Concern About Infant Sleep at Newborn and Two Months.

Objective: Maternal psychopathology has been linked to infant sleep patterns (Schwichtenberg & Goodlin-Jones, 2010). Less is known about how maternal factors, including their own sleep, influence their reported concern about their infants' sleep. This study explored maternal anxiety, age, and continuous hours of nightly infant and maternal sleep, as predictors of maternal concern about infant sleep.

Participants and Methods: Longitudinal (n = 30) and cross-sectional (n = 27) reports from PediaTrac, an online tracking tool for development, were collected at newborn (NB; n = 45) and two months (2m; n = 39). The cross-sectional sample was more educated (p = .001) with a higher income (p = .01). Samples did not differ in age (M = 30.25, SD = 6.22; p = .09), postnatal anxiety (M = 2.56; SD = 2.44; p = .30), concern about infant sleep (M = 1.58, SD = 0.87; p = .97), or continuous hours of maternal nighttime sleep for mothers (M = 4.94, SD = 4.53; p = .48) or their infants (M = 4.49, SD = 1.80; p = .78).

Results: A mixed-effects model predicted maternal sleep concern from child variables (age, sex), demographics (maternal age, education, income), sleep hours (child, mother), and maternal anxiety. Significant predictors were child sex (b = -0.64, t(39.06) = -3.30, p = .002), maternal nighttime sleep hours (b = -0.17, t(51.49) = -2.47, p = .017), and maternal anxiety (b = 0.09, t(67.89) = 2.39, p = .02). Greater maternal anxiety and fewer maternal hours of sleep predicted higher reported concern about infant sleep. Mothers of sons, compared to daughters, were more concerned about infant sleep.

Conclusions: Maternal rather than infant hours of sleep, as well as greater maternal anxiety predicted greater mother-reported concern about infant sleep. This raises important questions about whether poor maternal sleep heightens their anxiety, or whether greater maternal anxiety results in poorer maternal sleep, subsequently influencing their perceptions about their infant.

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S. LEONARD. School Functioning and Cognitive Outcomes for Youth Involved with Child Welfare Services.

Objective: Youth involved with the child welfare system are at significant risk of poor cognitive functioning and school functioning. The aims of this project were to (1) improve our conceptualization of school functioning, with particular attention to individual variation along multiple dimensions of school functioning, and (2) explore the impact of school functioning on youth cognitive functioning.

Participants and Methods: Participants included 2,668 youth (age 4 to 16 at baseline) participating in a national longitudinal study of youth in contact with the child welfare system following an investigation for alleged maltreatment. Patterns among a variety of school functioning indicators were determined via latent profile analysis and relationships between latent profiles and later cognitive functioning were explored using hierarchal regression.

Results: Latent profile analysis supported the interpretation of four profiles of school functioning, including a high functioning group, a moderate functioning with somewhat poor behavior group, a low functioning with poor behavior group, and a low functioning with good behavior and low emotional/cognitive engagement group. Aim 2 revealed that profile membership predicted youth cognitive functioning three years later, such that youth in the high functioning group demonstrated significant increases in cognitive functioning, and youth in both the moderate functioning with somewhat poor behavior group and the low functioning with good behavior and low emotional/cognitive engagement group demonstrated significant decreases in cognitive functioning. Surprisingly, the low functioning with poor behavior group also demonstrated a significant increase in cognitive functioning, but this difference was not significantly different compared to the high functioning group.

Conclusions: School functioning is a nuanced construct that has the potential to impact cognitive functioning outcomes of youth in the high risk population of children and adolescents involved with child welfare services.

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Prematurity/Low Birth Weight/In Utero Teratogen Exposure

S. CULOTTA, M. WEGFAHRT & M.C. BLACKWELL. Neuropsychological Assessment in Complex Congenital Neurological Disorders: A Case Study of Myelomeningocele.

Objective: This case study examines the neuropsychological profile of a child with myelomeningocele, a rare congenital condition and most severe form of spina bifida. The major features of myelomeningocele include Chiari II malformation, hydrocephalus, poor bowel/bladder control, leg paralysis/weakness, developmental delays and cognitive impairments.

Participants and Methods: This single-subject study examines an 11-year 5-month-old male referred for neuropsychological assessment secondary to significant delays related to his congenital conditions of myelomeningocele with Chiari II malformation, shunted hydrocephalus, incontinence, and leg paralysis. He had recently displayed increased behavioral dyscontrol and disturbed sleep, which was followed by identification of seizure activity. Evaluation included record review, interview, and standardized assessment measures.

Results: Assessment results are consistent with an overarching diagnosis of Neurodevelopmental Disorder secondary to Spina Bifida Myelomeningocele characterized by extremely-low intellectual and adaptive functioning, speech-language and motor coordination disorders, an attention disorder with executive functioning difficulties, and multiple specific learning disabilities. Relative strengths include above average picture memory skills and average word reading, decoding, spelling, word fluency skills, and low-average rote memory, as well as strong social intent.

Conclusions: This child's profile reveals many features consistent with literature on the cognitive phenotype of myelomeningocele, including strengths in rote language-learning and associative memory, as well as predictable difficulties with aspects of executive functioning and integration of information. His seizure disorder has been temporally related to behavioral dyscontrol and sleep disturbance and may complicate treatment of his other disorders. These results reflect the value of serial assessment in monitoring progress, updating areas of need, and facilitating educational and treatment interventions.

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H.G. HASLER, F. HAIST, T. JERNIGAN, J. STILES & N. AKSHOOMOFF. Growth of Formal and Informal Mathematics Skills in Children Born Very Preterm.

Objective: Very preterm (VPT) birth puts children at risk for difficulties in math. We examined informal (INF) and formal (FORM) math skills in children born VPT and their full-term born (FT) peers from 5 to 8 years old.

Participants and Methods: As part of a longitudinal study of VPT birth without significant complications, 60 VPT born (≤ 32 weeks gestation) and 34 FT born (≥38 weeks gestation) children were assessed annually for 3 years, beginning within 6 months of starting kindergarten. VPT children were excluded if their Verbal Comprehension index on the WPPSI-IV was <70. The Test of Early Mathematics Ability – Third Edition (TEMA-3) was administered at each of the three time points. The TEMA-3 provides a Mathematics Ability Score (MAS), as well as raw scores for the items that represent FORM and INF mathematics. Scores on each measure were compared between the VPT and FT groups using a repeated measures ANOVA.

Results: The FT group scored significantly higher than the VPT group overall on the TEMA-3 at each time point. The mean MAS scores for both groups were in the average range at each time point. There was a significant time by group interaction for both the FORM and INF scores. INF scores for the VPT and FT groups began to converge by age 7 (after first grade) while the FORM math scores between the groups diverged over time, with the largest group difference by age 7.

Conclusions: Overall, the VPT group scored significantly lower than their FT peers on the TEMA. At age 5 and 6, the VPT group scored lower in both INF and FORM math skills. After completing first grade (age 6 on average), the VPT group caught up to the FT group in the basic numerical facts that underlie math abilities. Yet, formal math skills continued to lag behind, and the groups became more discrepant after first grade. This indicates that, despite catching up to their peers in skills of numeracy and basic number-related facts, young VPT children may fall behind their FT peers in the application of and ability to perform more complex math operations.

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S.M. INKELIS & S. MATTSON. Age-Related Differences in Measures of Attention and Sluggish Cognitive Tempo in Children with Histories of Prenatal Alcohol Exposure.

Objective: While attention deficits are a hallmark feature of fetal alcohol spectrum disorders (FASD), the relation between attention and age has not been addressed. The current study examined the effects of age on an objective measure of attention, and a parent-report measure of sluggish cognitive tempo (SCT).

Participants and Methods: Subjects ages 8-13 (M=10.6) completed the attention network test (ANT), a computerized measure of 3 attention networks (alerting, orienting, executive control). Caregivers completed the SCT Scale. Three groups were included: children with prenatal alcohol exposure (AE; n=27), non-exposed children with attention-deficit/hyperactivity disorder (ADHD; n=23), and typically developing controls (CON; n=22). Multiple regression modeling predicted ANT and SCT outcomes as a function of group, age, and their interaction.

Results: AE subjects exhibited greater SCT scores, compared to ADHD and CON. The difference in SCT scores between AE and ADHD was moderated by age (b=-0.274, p=.001). Older age was associated with higher SCT scores in the AE group (b=0.118, p=.016) but lower SCT scores in the ADHD group (b=-0.156, p=.014). There was no relationship between age and SCT score in the CON group (b=.004, p=.934). For ANT Executive Control, moderating effects of age were also detected for the comparisons of AE vs. CON (b=-22.43, p=.026) and AE vs. ADHD (b=-22.17, p=.058). Older age was associated with significantly lower ANT Executive Control Score in CON (b=-14.06, p=.046). There was no age-related effect for ANT Alerting or Orienting scores.

Conclusions: SCT ratings tended to increase across age in AE children, whereas children with ADHD demonstrated fewer symptoms of SCT at older ages. Compared to ADHD and controls, AE children were also less efficient at older ages on attention tasks related to executive control. These findings suggest that the development of attention skills in children with FASD is distinct from non-exposed children with and without ADHD. Research supported by Grant R01 AA019605.

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A. LIND, R. PARKKOLA, V. SAUNAVAARA, M. LAASONEN, V. VOROBYEV, K. AHO, K. LAHTI & L. HAATAJA. Functional Magnetic Resonance Imaging During Visual Perception Task in Prematurely Born Adolescents.

Objective: Impairments in visual perception belong to the most common developmental difficulties related to prematurity and are often accompanied by problems in other developmental domains. The purpose of this study was to compare visual perception skills and brain activation during visual perception task in prematurely born and term born adolescents. This study is part of the PIPARI project (Development and Functioning of Very Low Birth Weight Infants from Infancy to School Age).

Participants and Methods: Tasks assessing particularly visual closure from Motor-Free Visual Perception Test, Third Edition were

administered during functional magnetic resonance imaging (fMRI) to 16 preterm (birth weight ≤1500 grams or gestational age <32 weeks) and 35 full-term participants at 13 years of age.
Results: Amount of correct responses and response time of correct responses in visual perception task did not differ significantly in preterm and control group. In fMRI, activation in left lateral orbitofrontal area differed significantly between the groups. The activation in this area was stronger in the preterm group.
Conclusions: Even though the performance in visual perception task was comparable in preterm and control adolescents, the brain activation differed. The increased activation in left lateral orbitofrontal area in the preterm group possibly reflects compensatory neural processes due to prematurity, resulting in task performance equal to that of full-term group.
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D.M. MCCALL, Q. YU, J. PIERCY, A. HEITZER, S. RAZ & N. OFEN. Hippocampal Volumetry and Episodic Memory in Preterm-Born Children.
Objective: The hippocampus (Hc) is essential for memory and vulnerable to the sequelae of premature birth. Relationships between subcomponents of the Hc and memory performance have been documented in adults. Yet little is known about the generalization of these findings to young children, whether term or preterm-born. This tripartite investigation focused on Hc subregion and subfield volumes, a potential latent construct for episodic memory, and the relationship between Hc volume and memory performance across birth weight (BW) and gestational age (GA).
Participants and Methods: Forty-eight children (20 preterm), ages 5-7, completed an MRI scan and several episodic memory tasks. An additional 18 children (13 preterm) completed the memory tasks but did not undergo an MRI. Manual demarcation was completed with high reliability for total Hc, Hc subregion, and Hc subfield volumes. A factor analysis was conducted to form a latent construct for episodic memory. Bivariate correlations and general linear modeling analyses were used to evaluate volume-performance relationships.
Results: Preterm-born children had significantly larger Hc Head volume than term born children. No other significant associations were observed between GA or BW and Hc subcomponents. Factor analysis yielded a three-factor structure, including a factor we termed episodic memory. Factor scores did not correlate with BW or GA. The episodic memory factor significantly related to Hc Body, Dentate Gyrus, and Subiculum volumes in the whole MRI sample.
Conclusions: The significant effect in the Hc Head may partially be due to the unique vulnerability of the Hc subregion CA1, which is relatively more largely represented in the Hc Head than the Hc Body. Although we provide limited evidence for differences in regional volumes between term and preterm-born children at this age, our findings do support the notion that specific relationships between Hc volume and memory are present in young children.
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A. PRITCHETT, Y. NOMURA, K. DANA, W. ZHANG, M. KOSURI, P. PEHME & J. BUTHMANN. The Association between Prenatal Cannabis Exposure and Higher Expression of MAO-A Gene in Girls.
Objective: Exposure to cannabis in utero is associated with higher rates of aggressive behavior and delinquency in children (El Marroun 2011). These effects are evident as early as 18 months post-partum and seem to be gender specific at this early developmental time point, influencing the behaviors of female infants only (Goldschmidt, 2000). Possible biological explanations of heightened aggression have implicated the MAO-A gene, a gene commonly referred to as the "warrior gene." Although there is mixed consensus regarding whether hypo or hyperactivity of the MAO-A gene leads to increased aggression, a study by Beitchman et al. (2004) provided evidence that MAO-A hyperactivity is associated with chronic pediatric aggression. The potential influence of prenatal cannabis exposure on the activity/expression of this gene has not previously been explored, but may offer valuable insight into the early mechanisms that lead to later aggression in exposed offspring.
Participants and Methods: The Stress in Pregnancy Study collected pregnancy data at two urban hospital sites. Maternal cannabis use during pregnancy was assessed via self-report questionnaires as well as a review of hospital social work and medical records. Human placenta was collected at time of birth. RNA was extracted and profiled from the placental tissue utilizing a custom-designed code set (NanoString Technologies, Seattle, WA). Of the participants with genotyping data available, 50 cannabis unexposed females and 9 cannabis exposed females were identified for the current analysis.
Results: Female children born to mothers who used cannabis during their pregnancy had significantly higher levels of placental MAO-A expression than unexposed females ($p = 0.04$).
Conclusions: Higher levels of MAO-A in response to prenatal cannabis exposure may serve as an epigenetic mark and potential mediator for later heightened aggression in prenatally exposed girls.
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J. PIERCY, A. HEITZER, A. MATTES, B. PETERS, J. KLARR & S. RAZ. Twin Gestation, Perinatal Risk, and Neuropsychological Functioning of Preschool-Age Children Born Prematurely.
Objective: The high rate of preterm twin births provides a unique opportunity to study the impact of modest discrepancies in perinatal risk on neuropsychological outcome among preterm-born children. We therefore investigated the link between intra-pair differences in perinatal risk and discrepancies in neuropsychological outcome at preschool age. Discordant perinatal risk was defined as either intra-pair discrepancy in birthweight SD > .33 or discrepancy in total number of perinatal complications >1.
Participants and Methods: We evaluated 56 (28 pairs) preterm (gestational age < 34 weeks) co-twins (age 3-4 years). 24 pairs were fraternal, and 18 pairs were same sex. As twin pairs share most aspects of the *intra-* and *extra-*uterine environment, irrelevant variability is greatly reduced, thus facilitating examination of the outcome correlates of differences in perinatal risk between higher and lower risk co-twins. Cognitive, language, and motor abilities were assessed with the Wechsler Preschool and Primary Scale of Intelligence-III/IV, Clinical Evaluation of Language Fundamentals-P2, and Peabody Developmental Motor Scales-2, respectively.
Results: We used linear mixed effects models with either birthweight SD or total number of complications providing the basis for risk classification (higher vs. lower). Based on birthweight SD, higher risk twins demonstrated poorer intellectual (WPPSI-III/IV FSIQ; $t[24.48] = 2.91$, $p = .008$), and motor (PDMS-2 Total Motor; $t[26.99] = 2.40$, $p = .024$) performance relative to their lower risk co-twin. In contrast, differences in the sum of complications were not associated with outcome discrepancies.
Conclusions: Poorer performance was seen in cognitive and motor domains in the higher-risk (lower birthweight SD) co-twins. The medium size mean intra-pair difference in birthweight SD (0.67 ± .12) reveals that a moderate increase in perinatal risk may nonetheless significantly impact developmental outcomes.
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A. MATTES, J. PIERCY, A. HEITZER, B. PETERS, J. BAPP NEWMAN, J. KLARR & S. RAZ. Preschool Measures of Executive Functioning and Language Development in Children Born Prematurely.

Objective: A body of literature links executive dysfunction and language impairment. Associations between emergent executive functions (EF) and early language skills have been demonstrated in young children at preschool age. Yet this association has not been sufficiently studied in preschoolers at-risk. We therefore focused on the link between two EFs, working memory and response inhibition, and language performance in a sample of preterm-born preschoolers.

Participants and Methods: We assessed 84 preterm (< 34 weeks gestation) preschoolers (3-4 years), served by William Beaumont Hospital (Royal Oak, MI) Neonatal Intensive Care Unit. We excluded cases with cerebral palsy and significant intracranial pathology. Working memory, response inhibition, and language were assessed with the Wechsler Preschool and Primary Scale of Intelligence –IV Working Memory Index (WPPSI-IV, WMI), NEPSY-2 Statue subtest, and the Clinical Evaluation of Language Fundamentals-P2 Core Language Index (CELF-P2, CLI), respectively.

Results: We used linear mixed effects models with WMI and Statue subtest scores as predictors and multiple birth as a random effect. Demographic (socioeconomic status, sex) and medical risk (gestational age, total complications) served as covariates. The WMI was somewhat more strongly associated with the CLI t($t(1, 84) = 6.634$, $p < .001$) than Statue scores ($t(1, 156) = 1.865$, $p = .064$). Additionally, poorer WMI performance was observed in cases with impaired (CLI < 85; n = 16), compared to intact (CLI ≥ 85; n = 68), language ($t(93.40) = -5.88$, $p = .001$).

Conclusions: Our findings extend the associations between EFs and language performance to at-risk preschoolers. These results are consistent with interactionist theories of language impairment that view language skill development as a process that is predicated upon the emergence and development of specific cognitive functions that arise prior to the preschool years.

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R. RIEGER, R.A. YEO, R. CAMPBELL, J. LOWE & R. OHLS. The Impact of Premature Birth, Gender, and Socioeconomic Status on Frontotemporal Gray Matter and Vocabulary Development.

Objective: Prematurity and socioeconomic status (SES) greatly impact language in children, but the neural substrates are poorly understood. Vocabulary is especially important as a scaffolding skill. Here we examine the importance of the constituents of gray matter volumes, surface area (SA) and cortical thickness (CT), in select frontotemporal regions, for vocabulary.

Participants and Methods: 59 children born preterm (24-31 weeks) and 21 born full-term were seen at preschool (male = 42) and school age (male = 37). Freesurfer measures of SA and CT were calculated for 11 left frontotemporal regions implicated in language skill. SES was defined by principal components analysis of demographic information. Receptive vocabulary was assessed with the WPPSI-III.

Results: Univariate GLM models, one per region examined, predicted vocabulary with group and gender as fixed factors, and SES, total intracranial volume (TICV), and that region's thickness and surface area as covariates. Interactions of group with SES, TICV, SA, CT were also included. At preschool age, group differences on receptive vocabulary neared significance; females had significantly higher scores. Interactions revealed that low SES preferentially affected the preterm group and frontal regions. Significant main effects of CT on language were found for analyses of some frontal regions. We also found a significant interaction between group and CT in some frontal analyses. Preliminary analyses at school age found a lesser effect of SES and a significant interaction between group and CT some frontal regions in predicting vocabulary.

Conclusions: At preschool age, there was a main effect of SES on vocabulary and the effect of prematurity was most evident in males. There was a main effect of CT in frontal, but not temporal regions, which was present at school age as well. These analyses help to shed light on the relationship between CT and SA and language abilities at this age, and highlight the sensitivity of the frontal lobe to preterm birth and SES.

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C.B. SADURNÍ GARCÍA & L.F. HERNÁNDEZ. Differences in the Neuropsychological Profile of Three Biological Sisters With a History of Intra-Uterine Exposure to Drugs Adopted at Different Ages: A Case Study.

Objective: This case study examined neuropsychological differences between biological sisters exposed to drugs while in-utero. Sisters were adopted together by the same foster mother but at different ages. As such, the time spent with their family of origin was different for each one. The purpose of the study is to examine the potential effect of prenatal maternal substance use on neuropsychological functioning and the impact of early stressors on development.

Participants and Methods: Three sisters underwent neuropsychological testing due to intra-uterine exposure to drugs. Specificity regarding mother's drug use, aside from including opiates, is unknown. Sister A (15) also had a history of ADHD, enuresis and behavioral problems and Sister B (12) had cognitive, academic and behavioral problems. Medical history was only remarkable at birth for Sister C (11). Relevant early stressors include severe neglect and recurrent family separation until adoption for Sisters A and B.

Results: Sister A exhibited Low Average IQ and commensurate abilities on other cognitive areas except fine-motor/visuo-motor skills, complex language, and inattention. Severe behavioral issues included truancy and substance abuse. Sister B exhibited Borderline IQ, global cognitive impairment, and poor frustration tolerance. Sister C's profile revealed mild complex-verbal and organizational difficulties. All sisters presented deficits in language, comprehension, working memory, auditory processing and executive functioning.

Conclusions: All 3 profiles are consistent with research of prenatal drug exposure. Besides immediate effects on the fetus, studies also reveal hippocampal damage and long-term problems with language, behavior and executive function (Behnke & Smith, 2013). Not having experienced early life stressors may have served as a protective factor in Sister C's generally healthier cognitive/emotional development. As such, this study substantiates prenatal health implications and how early experiences may mediate at-risk child development.

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Stroke/Cerebrovascular Injury & Disease (Child)

A. AILION, E. MAXWELL, N. STENCE, D. MIRSKY, T. BERNARD & R. BOADA. Neural Plasticity of Language Following Pediatric Stroke.

Objective: There is limited research on language recovery in pediatric arterial ischemic stroke (AIS). Theories of language after AIS include inter- or intra- hemispheric transfer, and a hybrid models. Previous studies on AIS report mixed findings on effects of age at AIS. Our goal was to investigate effects of size, location, and age at AIS on language outcome.

Participants and Methods: Children (n=33, m=13.25 yrs, SD=5.65 yrs) with a unilateral left AIS during childhood (m=9.54 yrs, SD=5.93 yrs, 51.5% F, 90.9% Caucasian) were tested at least 9 months post-AIS (mean=4.06 yrs, SD=.53 yrs). The Boston Naming Test (BNT) and the Token Test of the Multilingual Aphasia Examination (MAE) were

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administered. Multiple regression analysis was used to predict language skills from size, location, age at AIS, and maternal education (SES).
Results: Across tasks, outcome is affected by size, location, and age at AIS but the patterns vary (BNT AdjR^2=.36, p<.01; MAE AdjR^2=.54, p<.01). For BNT, those with left anterior AIS in middle childhood are more sensitive to size than those who are younger or older at AIS (β=.34, p<.05). SES was a strong predictor of BNT (β=.60, p<.01), with an unexpected interaction with age at AIS (β=.33, p<.05); older age at AIS and high SES resulted in higher BNT, but the reverse was true for low SES. In contrast, older age at AIS was associated with better MAE (β=.76, p<.01). Age at AIS x location interaction was significant, with better outcome in older children with cortical (β=-.68, p<.01) and posterior (β=-.45, p=.05) AIS.
Conclusions: BNT results are consistent with the hybrid model, assuming it is less efficient than inter- or intra-hemispheric models. Further exploration of SES is warranted to see if it represents a premorbid or post-AIS effect. MAE findings are consistent with an early vulnerability model. These results highlight that the relationship between location, age, and size may be different across language outcomes. Future research using functional neuroimaging is warranted.
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A. DEOTTO, C. CHAMPIGNY, M. DESROCHER & R. WESTMACOTT. Mental Health Following Pediatric Stroke: The Role of the Environment and Personal Experience.
Objective: Pediatric stroke has been found to be an important source of acquired brain injury that can adversely impact cognition in children. However, less is known about mental health in this population. This study investigates psychological outcome in pediatric stroke and the personal and environmental factors that can influence risk or resilience.
Participants and Methods: Twenty-eight children between the ages of 8-18 years with a history of ischemic stroke and 32 demographically equivalent healthy controls participated. Participants were administered a standardized questionnaire of symptoms of anxiety and low mood (RCADS), as well as tasks of motor speed and executive functioning (D-KEFS). Parents of participants completed questionnaires on child mental health (Conners Clinical Index), caregiver mental health, and family functioning. Medical history was also examined.
Results: In comparison to controls, the stroke group was significantly more likely to have a physical disability (p<.001), learning problems (p=.001), emotion regulation difficulties (p=.003), and an anxiety disorder diagnosis (p=.033). However, groups were similar on standardized measures of mood, everyday worry, and life satisfaction. Family functioning, socioeconomic status, and parent mental health were average to high across participants, indicating the presence of protective environmental factors. Linear regression models revealed that parent mental health was a significant predictor of internalizing (R^2 = .13, p=.004) and externalizing (R^2 = .23, p<.001) symptoms in children with stroke. Personal variables associated with increased symptomatology included learning problems, motor difficulties, and executive dysfunction.
Conclusions: Despite the fact that many children with stroke experience adversities, they appear to be a resilient group with regard to mental health. Good parent mental health is related to positive outcomes. Children experiencing difficulties with learning and motor functioning may be most at risk.
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T.A. DUDA, M.R. GEORGE, L. NASSIF & E. MUSCAL. Primary Central Nervous System Vasculitis – An Interdisciplinary Case Study.
Objective: Primary Central Nervous System (PCNS) Vasculitis is a rare and potentially fatal cause of childhood stroke with overlapping and varied symptomatology (e.g., focal acute neurological deficits, cognitive impairment, or encephalopathy). Unfortunately, little is known about its pathogenesis and long-term outcomes. The following case study was conducted to describe the functioning of a patient with PCNS vasculitis from a multidisciplinary and longitudinal perspective.
Participants and Methods: The authors report findings from serial neuropsychological evaluations, imaging studies, and genetic evaluation of a now 14-year-old, right-handed teenage boy with PCNS with posterior circulation vasculitis.
Results: The patient experienced approximately 7 clinical strokes and >10 TIAs since diagnosis 7 years ago and receives chronic anticoagulation and antiplatelet therapy. His most severe presentation of vascular insufficiency occurred 2 years after diagnosis and included diplopia, altered mentation, and respiratory arrest. His most recent event (7 years after diagnosis) resulted in hospitalization due to left arm weakness and dizziness. Primary parent concerns included memory difficulties. Serial neuropsychological evaluations revealed intact and stable intellectual/academic scores with relative processing speed and working memory weaknesses observed over time. He also consistently demonstrated relatively weaker non-dominant (left) vs. dominant hand (right) performance. Reported psychosocial functioning remained broadly within age expectations, although increased attention problems were indicated.
Conclusions: This case study emphasizes the need to identify vasculitis as a differential diagnosis in children and adolescents with multiple stroke and TIA events. Early identification followed by prompt and aggressive treatment may offer a stable course.
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H.J. LOBLEIN, L. MERRILL & K.E. JONES. A Case of Phonological Alexia Following Pediatric AVM Rupture.
Objective: Phonological alexia is a specific type of acquired reading impairment resulting in the disruption of grapheme-phoneme conversion. It commonly occurs in the context of aphasia and is caused by left perisylvian lesions. It is categorized by intact whole word recognition but impaired pseudoword decoding. We describe the case of phonological alexia following a left frontal hemorrhage due to a ruptured arteriovenous malformation (AVM).
Participants and Methods: Our patient was a 9-year-old boy with a prior history of ADHD-like symptoms. The AVM was located in the M4 segment of the MCA, and MRI showed hemorrhage extending from the left posterior frontal cortex to the margins of the lateral ventricle. The left sensorimotor cortex, supplementary motor area, and cortical spinal tract were also impacted. He was followed by neuropsychology from his acute inpatient rehabilitation stay until 4 months post-injury, at which point a neuropsychological evaluation was completed.
Results: At 3 weeks post-injury, he demonstrated dense right hemiparesis, severe expressive aphasia, and mild receptive language difficulties. At 4 months post-injury, he exhibited occasional aphasic errors, but profound impairments in pseudoword decoding, spelling, and phonological processing. Expressive vocabulary, confrontational naming, repetition, receptive language, verbal memory, whole word recognition, and auditory comprehension were within age expectations. He also exhibited weaknesses in aspects of regulatory control, which were felt to be baseline.
Conclusions: While he could discriminate phonological differences when hearing words, he was not able to manipulate phonemes when speaking, reading aloud, and writing. This pattern of specific deficits illustrates a functional disconnection between posterior and anterior language systems, suggesting damage to the arcuate fasciculus. This case demonstrates the importance of serial neuropsychological monitoring to detect resolving language impairments to best inform rehabilitative treatment.
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R. PETERSON, K. MCDONALD, T. WILLIAMS & R. WESTMACOTT. Characterizing Language Outcome Following Childhood Basal Ganglia Stroke.

Objective: The basal ganglia are a cluster of subcortical brain structures important for executive function, but their contribution to language is less understood. The present study explored language outcomes of childhood arterial ischemic stroke isolated to the basal ganglia to determine if there are any consistent language difficulties within this population, also considering qualitative language difficulties that may not be captured by DSM diagnoses; and examine which medical and demographic variables account for individual deficits in language.

Participants and Methods: Participants (N=30; M_{age}=12.34 years, *SD*=3.56) were identified upon enrollment in the Children's Stroke Registry. A language coding scheme, which examined expressive and receptive language, verbal fluency, narrative discourse, pragmatic language, and academics, was developed from data acquired from neuropsychological testing and reports.

Results: Overall intellectual functioning and verbal comprehension fell in the average range. Twelve of the participants had a psychological diagnosis, the majority of which were learning disorders (67%). Based on coding scheme, seventy-two percent of undiagnosed children had language issues (mild-severe range). These children, in particular, had higher-order language difficulties in verbal fluency (28%), narrative (22%), and pragmatic language (28%), academic literacy (28%), and numeracy (44%). There was a positive association between infarct size, ESL/immersion education (p=.050), and presence of a psychological diagnosis (p=.004). Presence of a diagnosis was also correlated with literacy (p=.039).

Conclusions: The results highlight that language issues following basal ganglia stroke may not be fully captured by standardized neuropsychological tests and psychological diagnoses. Findings reinforce the need to examine individual differences beyond diagnoses when studying cognitive outcomes, particularly as it relates to language functioning.

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M. WEGFAHRT, S. CULOTTA & V. CULOTTA. The Role of Neuropsychological Assessment in Intrauterine Infract.

Objective: The purpose of this single-subject case study is to examine the neuropsychological profile of a youngster with porencephaly secondary to a left hemisphere intrauterine infarct. Outcome following intrauterine infract is dependent on the region, size, and developmental stage at which it occurs. Perinatal stroke, which includes intrauterine strokes, occurs in one in 4,000 babies. Intrauterine stroke may be caused by antenatal ischemic thrombotic or hemorrhagic injury. After birth, intrauterine infarct outcomes may include seizures, cerebral palsy, neurocognitive disorders, and hemiparesthesia. Current diagnostic tools (e.g., ultrasound and MRI) have provided increased detection of intrauterine abnormalities, such as infarct.

Participants and Methods: This single-case study examines a 6-year 6-month-old male referred for neuropsychological evaluation. Porencephaly was diagnosed at 36 weeks using a fetal MRI, and subsequent imaging revealed diminished brain volume. A specific etiology was not identified. Assessment included review of medical records and standardized assessment measures.

Results: Findings revealed a complex neurodevelopmental profile marked by diminished processing speed, executive functioning and language skills in addition to emotional regulation difficulties. Strengths included visual memory, receptive vocabulary, and left upper extremity fine motor speed. Medical history reveals seizures, right hemiparesis, and developmental coordination delays.

Conclusions: This case study reveals the complex neurodevelopmental profile of a 6-year-old youngster who sustained an intrauterine infract. The child's neuropsychological profile, marked by strengths in visual memory and receptive language and weaknesses in executive functioning, is useful in facilitating educational and treatment planning. Early detection through fetal imaging led to early intervention and serial neuropsychological assessments which can be invaluable in maximizing positive outcomes.

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Genetics/Genetic Disorders

D.D. SCHWARTZ, R.H. FEIN & M.E. AXELRAD. Cognitive and Adaptive Functioning in Children and Adults with Robinow Syndrome.

Objective: Robinow syndrome (RS) is a very rare genetic condition, with fewer than 250 cases described in the literature. It is characterized by skeletal abnormalities, short stature, and distinctive facial features. It has been estimated that 10-15% of people with RS show delayed development, but no studies have formally assessed cognitive and adaptive functioning. The objective of this study is to provide a first description of cognitive and adaptive functioning in RS.

Participants and Methods: Fifteen participants (10 males) ages 4-51 years were administered the Wechsler Abbreviated Scale of Intelligence-Second Edition and the Beery-Buktenica Developmental Test of Visual-Motor Integration. The Behavior Rating Inventory of Executive Function was completed by adult participants (n=7) and by child participants' caregivers (n=8). Children's caregivers also completed the Adaptive Behavior Assessment System, Third Edition, and an ADHD symptom scale.

Results: Findings indicated average intellectual functioning. Only one participant had an IQ in the very low range (SS < 80). Overall adaptive functioning was low-average, with 3/8 children (37.5%) showing very low adaptive skills. Visuomotor integration was average, though 6/14 (43%) had below-average scores, with 3 showing impairment. Parent report indicated executive dysfunction in 3/8 (37.5%) children, with at-risk symptoms indicated in a fourth. These same four children also had attention problems. Adult self-report did not indicate any executive difficulties.

Conclusions: Our findings suggest there may be a high prevalence of executive dysfunction and inattention in children with RS. Observations during testing suggested similar problems may be present in adults, but symptoms were not indicated in self-report. Intellectual functioning was average, but adaptive skills were below average, and deficits in visuomotor integration were evident in ~40% of participants. These are the first reported findings of cognitive and adaptive functioning in individuals with RS.

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PM Coffee Break

3:45–4:00 p.m.

Debate: Going to Pot? Clearing Away the Smoke on Brain, Behavior, and Cannabis

Moderator: Raul Gonzalez

Presenters: Igor Grant, Krista Lisdahl

4:00–5:00 p.m.

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Paper Session 8. Validity Testing

Moderator: Elise K. Hodges

4:00–5:30 p.m.

S. DHILLON, A. SEKELY, K.K. ZAKZANIS & R.M. BAGBY. The Assessment and Detection of Feigned Symptoms following mTBI: Performance and Symptom Validity Test Diagnostic Efficiency and Implications.

Objective: The administration of Performance and Symptom Validity Tests is a necessary component of a neuropsychological evaluation. The evidence is lacking to determine what tests are best at detecting overreporting of symptoms associated with mTBI and whether the use of both SVTs and PVTs maximize detection accuracy is lacking. The current study examined which of a set of PVTs and SVTs from the MMPI-2-RF and PAI are best at detecting overreporting of mTBI related symptoms.

Participants and Methods: Participants ($N = 216$) completed a battery of tests that included PVTs and the MMPI-2-RF and PAI across two administrations using a simulation design. Participants were randomly assigned to either an 'honest' or 'feigning' condition and completed a battery or PVTs and SVTs. Logistic regressions were performed to determine which PVTs and SVTs were best in distinguishing the two groups; if either the PVTs or SVTs added significant incremental predictive capacity to one another.

Results: The differences between experimental groups on all PVT and SVT scales and indices were statistically significant, $F(13,168)=33.3$, $p<.0001$;Pillai'sTrace=0.74, partialη^2=.74;$m_{\text{effect size}}$=1.74). Nine models were tested and summary statistics and effect size estimates for R^2 and diagnostic efficiency statistics for all nine models will be discussed. When MMPI-2-RF SVT scales were entered into the regression after the three PVTs, the change in model fit was significant (change in $\chi^2 = 50.27$, $p<.001$) indicating that the MMPI-2-RF SVT scales add significant incremental validity to the PVTs in differentiating groups. Two PVTs and the RBS scale of the MMPI-2-RF were identified as the significant predictors among all scales.

Conclusions: Results demonstrate that 93% of individuals were correctly predicted as over-reporting and 96% were correctly predicted as not over-reporting when the MMPI-2-RF was added to a PVT battery, suggesting that including the MMPI-2-RF in addition to two PVTs would be useful in differentiating between false positives from true positives.

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T. BABIKIAN. Standard Intelligence Tests as Measures of Effort and Malingering in the US.

Neuropsychologists' role in forensic evaluations has become increasingly prevalent in recent years. At the core of such evaluations, determining effort and ruling out malingering are essential. The use of tests specifically dedicated to measure effort adds to battery length and such measures are likely targets of coaching. Thus, there is value in the use of standard cognitive tests to serve "double duty" and detect noncredible performance instead of, or in addition to, freestanding effort measures. The widespread use of intelligence tests has made them particularly efficacious to serve in this manner. WAIS-based subtest scores as measures of effort in both simulating and real-world noncredible subjects will be reviewed in a US sample. Digit Span performance in particular, either in isolation or as contrasted with Vocabulary, is particularly sensitive to noncredible performance. Time scores for forward digit span, with sensitivities ranging from 37% to 50%, may be particularly effective in identifying those noncredible individuals who use a test-taking strategy of slowed, but not necessarily inaccurate, performance. Although noncredible performers generally score comparably to brain-injured samples in overall IQ scores, there are notable differences in patterns of subtest performance between credible and noncredible groups. Current guidelines for cutoff criteria for noncredible performance in a general clinical sample will be reviewed, with revised or cautionary approaches for certain patient groups (e.g., intellectual disability, dementia, cultural/language factors). In conclusion, effort indices derived from the WAIS battery appear to have comparable sensitivity (approximately 50%) when cutoffs are set to acceptable specificity levels (i.e., ≥90%). Thus, performance can be used to "rule in" noncredible performance; however, normal performance cannot be used to "rule out" malingering, given that approximately 50% of noncredible patients pass the indicators.

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J.C. ARANGO-LASPRILLA. The Test of Memory Malingering among Latin American Spanish-Speaking Adults: A Cross-Cultural Analysis.

The Test of Memory Malingering is widely used internationally, however, there is a dearth of research that has assessed the utility of this measure in different Latin American countries.

The goals of this presentation are 1) To present the normative data on TOMM across 8 countries in Latin America, with country-specific adjustments for gender, age, and education, where appropriate. 2) To evaluate the specificity of the TOMM Trial 2 on this sample and 3) to examine the specificity of the TOMM and performance differences among four groups of 257 healthy adults in Colombia: absolute illiterates with no education (n=59), functional illiterates with no education (n=66), literates with ≤12 years education (n=66), and literates with some post-secondary education (n=66).

The sample consisted of 3,590 healthy adults who were recruited from Argentina, Bolivia, Chile, Mexico, Paraguay, Peru, and Puerto Rico. Each subject was administered the TOMM as part of a larger neuropsychological battery. It was found that t-tests did not show significant differences in TOMM performance between men and women in any countries for the TOMM Trial 1 or 2. As a result, only age and education adjusted norms were generated. Trial 2 TOMM scores were negatively associated with participants' age and positively associated with level of education. Country development, as measured by the United Nations Human Development Index, was also positively associated with TOMM scores. There were significant differences in TOMM Trial 2 performance, with the two illiterate groups performing significantly lower than the educated participants.

Clinical implications and future research directions from these results will be discussed.

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L.E. AYEARST & R. MCCAFFREY. Test Fairness and the Revision of the Test of Memory Malingering (TOMM).

The Test of Memory Malingering (TOMM) was first published by MHS in 1996. Over the past 20 years, it has become one of the most widely used and extensively researched malingering tests used by neuropsychologists. Recent practice surveys suggest neuropsychologists use the TOMM more than any other performance validity test (PVT). A basic literature search using the keyword "TOMM" reveals that that the TOMM has the largest literature base supporting its use compared to other PVTs.

Despite its continued popularity and widespread use, there is a paucity of literature surrounding the use of the TOMM outside of North America. Evidence to date suggests that current published cut-off scores are appropriate for use in the various countries that have explored this issue. Regardless of this, the familiarity of the images cross-culturally may be of concern to some given the new chapter in the Test Standard dedicated to Test Fairness. As a result, one of the goals of the revision was to have the images that make up the TOMM reviewed by a panel of external experts to identify images that were outdated (e.g., a spinning wheel), culturally loaded (e.g., a church), or otherwise inappropriate

(e.g., a dripping needle) and replace them with images that were deemed more culturally universal and relevant.

While the paradigm remains unchanged, proper due diligence requires us to ensure that any changes to the images have not resulted in a change to the application of the well-established cut-off scores. Results to date from two pilot studies (N = 156 and N = 82) have suggested that the image revisions have not impacted the cut-off. Changes to the TOMM will continue to undergo extensive empirical evaluation in a large Census matched sample of adults, a variety of clinical samples, as well as in samples of Spanish-speaking individuals. The progress on this effort will be shared and discussed.

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K. BOONE. Impact of Language Status (English as a second language and non-English-speaking) on Performance Validity Tests.

Objective: Provide specificity data for monolingual Spanish-speakers of lowered educational level, and English as a second language (ESL) speakers, on various performance validity tests (PVTs).

Participants and Methods: In Robles et al. (2015), monolingual Spanish-speakers (n = 115) with 1 to 10 years of education were administered the Rey 15-item plus recognition, Rey Word Recognition Test, the Dot Counting Test, and the b Test. Additional published studies from our lab have provided specificity data for ESL speakers on these PVTs, as well as for the Rey Osterrieth Effort Equation, Comalli Stroop, and Warrington Recognition Memory Test.

Results: Monolingual Spanish-speakers with 0 to 6 years of education performed more poorly than did participants with 7 to 10 years of education on the Rey 15-Item combination equation, Rey Word Recognition total correct, and b Test E-score, but no education effect was observed for the Dot Counting Test. Cutoffs were identified that maintained approximately 90% specificity for the education subgroups separately. Some of these cutoffs match, or are even more stringent than, those recommended for use in English speakers with a higher educational level (i.e., Rey Word Recognition correct false positive errors; Rey 15-Item recall intrusions and recognition false-positive errors; b Test total time; and Dot Counting E-score and grouped dot counting time). Validation studies conducted in English have shown that cut-offs for the Dot Counting Test, Rey 15-item plus recognition, b Test, Rey Osterrieth Effort Equation, and Comalli Stroop are not impacted by ESL status, while the Rey Word Recognition Test and Warrington Recognition Memory Test require minor adjustment of cut-offs to be adequately protective of non-native English-speakers (i.e., to maintain specificity of at least 90%).

Conclusions: Emerging research is providing guidelines regarding use of PVTs in monolingual Spanish-speakers of low education and in ESL speakers.

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S. TRUTER & A.B. SHUTTLEWORTH-EDWARDS. Cut-off Scores on Four Effort Tests for Educationally Disadvantaged South African Adults.

Objective: This study aime to investigate performance of South African adults with disadvantaged quality of education on four effort measures: Dot Counting Test, Rey Auditory Verbal Learning Test (RAVLT) Recognition, RAVLT Effort Equation, Rey 15-Item Test plus Recognition (Rey 15-IR).

Participants and Methods: The sample consisted of healthy South African adults (N = 137), proficient in English, whose first language was other than English, with a background of disadvantaged quality of education. The sample was stratified for age (18-39; 40-57 years), and level of education (8-10; 11-12 years). Measures were administered in English as part of a wider study including other neuropsychological tests. Cut-off scores for poor effort were based on a worse score than achieved by 90% of these probably motivationally preserved participants, and descriptively compared to data for a US Caucasian group (Salazar et al., 2007).

Results: For RAVLT Recognition, the cut-off score for the US Caucasian group was applicable for all South African subgroups. For Rey 15-IR the cut-off score for the US Caucasian group was applicable to all South African subgroups, with the exception of the older 40-57 year old group with lower 8-10 years of education, where a more lenient cut-off score was indicated. For the Dot Counting Test and RAVLT Effort Equation, the South African cut-off scores were more lenient than for the US Caucasian group, with cut-off scores for the older South African group with the lower level of education being the most lenient.

Conclusions: It is evident that cut-off scores on effort tests may need to be adjusted for age and education. Depending on the measure, cut-off scores for a Western population may be, but are not necessarily, appropriate for a non-Western group. Further, older South African adults, with lower levels of disadvantaged education are more likely than younger groups with higher levels of education, to need more lenient cut-off scores on effort tests.

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Paper Session 9. Bilingual & Cross-Cultural

Moderator: Alberto L. Fernandez

4:00–5:30 p.m.

I. VELEZ-URIBE & M. ROSSELLI. The Influence of Proficiency on Emotion Word Processing in Spanish-English Bilinguals: An ERP Study.

Objective: An EEG experiment was designed to test the influence of level of proficiency in the processing of emotion words between languages in a sample of Spanish-English bilinguals.

Participants and Methods: The sample included Spanish-English bilinguals divided by proficiency levels: 23 Balanced and 26 Unbalanced bilinguals. The participants rated words in three categories (negative, neutral, and positive) in terms of emotional valence in English and Spanish while EEG was recorded. Event-related potentials were calculated for two components related to emotion processing: the early posterior negativity (EPN) and the late positive component (LPC). The latency and amplitude of each component were included in the analyses as dependent variables.

Results: Emotion words presented shorter latencies than neutral words on the EPN, $F(2,90) = 3.03$, $p = .05$, $p\eta^2 = .06$, indicating a processing advantage of emotional content. The EPN resulted in a significant effect of Valence, $F(2.\ 90) = 4.64$, $p < .05$, $p\eta^2 = .09$, with larger amplitudes both emotion categories than for neutral words. The main effect of Language was significant for the LPC amplitude, $F(1,44) = 12.38$, $p = .001$, $p\eta^2 = .22$, with larger amplitudes for emotion than for neutral words for both groups in English, and for the Balanced group in Spanish. The Unbalanced group, however, presented larger LPC amplitudes for positive than for neutral, and for neutral than for negative words in Spanish.

Conclusions: These results suggest that the Balanced and Unbalanced groups process emotion content similarly in English, but differently in Spanish. The Valence effects were consistent across languages for the Balanced group, but not for the Unbalanced group which might reflect an attenuation of the valence effect for negative words in Spanish for this group and could indicate weaker emotional reactivity to negative words in the less proficient language.

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M.M. DIAZ, M. ARCE RENTERÍA, N. SCHUPF, R. MAYEUX & J.J. MANLY. Do cognition and education protect against the "Immigration Health Paradox"?

Objective: We hypothesized that age at immigration would predict mortality, such that people who immigrated at a young age would be at higher risk, and that education and cognitive function would moderate these effects.

Participants and Methods: Participants were 5,890 older adults age 65+ (67.4% women) from a community-based longitudinal study of memory and aging. There were 2,447 deaths, confirmed via Social Security Death Index searches, over a total possible 25 years of follow-up. Cox regression models tested the effects of age at immigration on mortality risk, using years to death (or last visit) since baseline as the time scale, adjusting for confounders.

Results: Among non-Hispanics, and adjusting for age, marital status, sex/gender, and race, immigrants who arrived before age 15 were 69% (95% CI=.52-.90) less likely to die than non-Hispanics who were born in the US, and those arriving age 16-35 were 80% less likely to die (95% CI=.68-.95). Within Hispanics, immigrants who arrived after age 16 had the same dementia risk as US Born, but those who arrived before age 15 were twice as likely to die (RR=1.95; 95%CI=1.09-3.48). Education did not interact with immigration age on mortality risk. Among non-Hispanics, elevated risk for those born in the US was slightly lower in participants with higher cognitive test scores. In Hispanics, mortality among those who immigrated before the age of 15 was more elevated in those with high neuropsychological test scores.

Conclusions: Early age at immigration was protective among non-Hispanics but increased mortality risk among Hispanics. Schooling did not modify age at immigration effects. Moderation of immigration age effects on mortality was as expected in non-Hispanics, but was contrary to hypotheses in Hispanics. Future work will explore whether different motivations and opportunities for immigration across race/ethnicity explain these results.

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M. ARCE RENTERÍA, P. LAO, J. VONK, N. GLADSTEIN, A.M. BRICKMAN & J.J. MANLY. The Role of Bilingualism on Age-Related Structural Differences and Cognition.

Objective: Aging is associated with cortical thinning and subsequent cognitive decline. While bilingualism is associated with increased cortical thickness, it is unclear whether it protects against age-related structural declines and whether it maintains cognition despite cortical loss. We hypothesized that bilingualism would buffer the effects of 1) aging on cortical thickness, and 2) cortical thinning on cognition, after accounting for environmental and sociocultural factors (i.e., education, socioeconomic status[SES]).

Participants and Methods: Participants were 277 Spanish-speaking immigrants in a longitudinal aging study (*M* age=76yrs *SD*=6; 88% Hispanic; 60% women), that underwent a neuropsychological evaluation, 3T MRI scanning, and did not have dementia at study visit. Bilingualism was defined by self-reported English proficiency. Multiple regression models tested main effects and interactions of 1) bilingualism and age on cortical thickness, and 2) bilingualism and cortical thickness on cognition, adjusted for sex/gender, education, proportion of life in the US, childhood and adult SES, and nationality.

Results: Bilingualism was associated with greater bilateral parahippocampal thickness (β=.23, p=.007; β=.19, p=.017) and bilateral hippocampal volume (β=.17, p=.021; β=.20, p=.008). There was a significant age X bilingualism interaction on left entorhinal cortex thickness (β=-.26, p=.006), indicating that older bilinguals had a thinner entorhinal cortex than all monolinguals. Bilingualism was associated with better cognitive scores (all p's<.05), but did not moderate the relationship between cortical thickness and cognition.

Conclusions: Bilingualism did not protect against age-related structural declines or moderate the relationship between cortical thickness and cognition. However, bilingualism was associated with overall better cognition and thicker parahippocampal gyrus and greater hippocampal volume. Future analyses will explore whether differences in brain structure affect cognitive trajectory later in life.

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A. LEON, R. DURAZO-ARVIZU, H. GONZÁLEZ, M. DAVIGLUS, L.T. EYLER, L. GALLO, J. CAI, M.M. LLABRE, K. PERREIRA, J. CARRASCO, T. KHAMBATY & M. LAMAR. Associations of Spanish-English Bilingualism and Sex Differences in Cognitive Performance in the Hispanic Community Health Study/Study of Latinos.

Objective: Hispanics have a higher prevalence of Alzheimer's disease (AD) compared to non-Hispanic whites. Alterations in learning and memory, combined with executive dysfunction, accelerate onset of dementia regardless of race or ethnicity; however, sex-differences exist for many tasks in these domains. Additionally, research has documented unique patterns of cognitive performance in bilingual persons. We examined the separate and interactive associations of sex and bilingualism with cognition in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL).

Participants and Methods: HCHS/SOL is a multi-center, prospective community-based study. The current analyses include data from 4577 foreign-born men and women >45 years old who self-reported their first language as Spanish and were evaluated in Spanish. Bilingual status was assessed by questionnaire and cognitive testing included verbal learning and memory, fluency, and Digit Symbol Substitution (DSS). Multivariable linear regression models were used to evaluate the separate and interactive associations of sex and bilingualism with cognition adjusting for relevant confounders and the complex survey design (sampling weights were also used).

Results: 246 men and 289 women were bilingual Spanish-English speakers (n=535) and 1307 men and 2735 women were monolingual Spanish speakers (n=4,042). Female sex was associated with higher performance on all 4 cognitive variables (p-values<0.05); being bilingual was associated with higher fluency and DSS scores only (p-values<0.01). There were no significant interactions of sex by bilingual status for any cognitive variable in fully-adjusted models.

Conclusions: Processing speed and fluency (not verbal learning & memory), were better for bilingual compared to monolingual Spanish-speakers. In contrast, women performed better than men in all domains. It is important to consider bilingualism and sex when interpreting neuropsychological findings for the detection of cognitive alterations associated with AD in this population.

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V.L. SHAFER, I. BARRIERE, S. KRESH & K. AHARODNIK. Limited Input, Positive Transfer and Environmental Factors: Behavioral and Neurophysiological Effects on Receptive Language in Bilingual Preschoolers.

Objective: This talk will focus on how learning two languages modulates receptive language and how neurophysiological measures help decipher the underlying processes leading up to comprehension. This talk will present 1. a cross-linguistic study on the comprehension of Subject-Verb agreement; 2. an event-related potential (ERP) study in which brain responses to Subject-Verb agreement are measured in 3-5 year old children.

Participants and Methods: For study 1, 109 3 to 5 year old monolingual English-speaking and Hebrew/Russian/Spanish-speaking bilinguals were tested on Subject-Verb agreement (*the boy***s** *play*Ø versus *the boy*Ø *play***s**). Participants were administered a video-matching task.

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The verbal stimuli included similar construction across languages. For study 2, ERPs were recorded as 8 3-5 year old children listening to sentences describing activities (e.g., the *dogØ jumps* versus ungrammatical: *the dogØ jumpØ*). Children were not required to perform a task and asked to sit quietly and look at the pictures and listen to the sentences.
Results: In study 1, significant positive correlations between performance in the two languages suggest a positive transfer effect. It was stronger in balanced bilinguals than in those exposed mostly to English, suggesting that transfer effects over-ride percentage of input to English. In study 2, a broad posterior positivity (P600) to ungrammatical verbs was observed about 200 ms later than found for adults, indicating detection of ungrammaticality.
Conclusions: These results have implications for the assessment of bilingual children; specifically, it is critical to consider the language background of the children as well as the contextual factors in which they are raised. Our data also indicate the use of neural measure provides a window into whether failure to comprehend agreement is related to uncertainty of how to interpret detected grammatical patterns or to a delay in learning the grammatical patterns.
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D.S. SMIRNOV, A. STASENKO, D. SALMON, D.R. GALASKO, J. BREWER & T.H. GOLLAN. Differing Effects of Bilingualism and Education on Brain Structure in Alzheimer's Disease (AD).
Objective: Both bilingualism and education have been suggested to contribute to cognitive reserve in dementia. Yet it is unknown whether these measures are reflective of a common reserve substrate, or if they have differing effects on the brain.
Participants and Methods: 21 Spanish-English bilinguals diagnosed with dementia due to AD and 30 healthy elderly controls from the UCSD ADRC were administered the MINT, a picture naming test, in both English and Spanish. Subjects' structural MRI scans were processed using the FreeSurfer (v5.3.0) pipeline. Regional volumes (corrected for intracranial volume) and cortical thicknesses were examined in *a priori* selected frontal, temporal, and subcortical areas. Dominant language MINT, non-dominant MINT, and education were entered into a linear regression with each imaging measure, covarying for age.
Results: Non-dominant MINT performance in patients with AD was positively associated with left caudal ACC volume and thickness ($p < 0.01$ and $p = .01$). In contrast, dominant MINT was positively associated with left entorhinal thickness ($p = 0.01$). Surprisingly, education was *negatively* associated with right caudal ACC thickness ($p < .01$), bilateral PCC thickness ($ps = .01$), and the left frontal pole volume ($p = .01$). In healthy controls, neither MINT nor education was significantly associated with any region.
Conclusions: While dominant language performance in patients was associated with atrophy of regions affected in early AD, non-dominant MINT performance was associated with a region commonly implicated in bilingual language switching (the left caudal ACC), suggesting a structural protective effect of bilingualism in this region. In contrast, unique gray matter associations with education might reflect resilience to atrophy such that patients with more education can withstand more AD pathology before showing signs of dementia. We conclude that education and bilingualism contribute to cognitive reserve through different mechanisms affecting distinct brain regions.
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Paper Session 10. Stroke / Cerebrovascular

Moderator: Andrew Colvin

4:00–5:30 p.m.

A. CHESEBRO, J. MELGAREJO ARIAS, K. IGWE, P. LAO, B. RIZVI, M. BUDGE, J. LEE, G. MAESTRE & A.M. BRICKMAN. Nocturnal Blood Pressure Dipping and Hypertension Are Associated with White Matter Hyperintensities and Cognition.
Objective: White matter hyperintensities (WMH) observed on T2-weighted MRI are a marker of small vessel cerebrovascular disease. Hypertension is a known risk factor associated for greater WMH volume and lower cognitive functioning. A lack of nocturnal blood pressure decrease ('non-dipping') has also been associated with poor vascular outcomes, although this relationship has not been fully examined. The purpose of this study was to examine the effect of dipping status and hypertension on WMH volume and cognition.
Participants and Methods: MRI scans, 24-hour blood pressure monitoring and neuropsychological evaluations were performed in a sample of 435 adults in Venezuela (age: 59±13 years, sex: 27% male, education: 7.4±4.7 years). Total WMH volume was calculated from the acquired scans. Participants were classified as 'dippers' if their systolic blood pressure (SBP) decreased at night, 'non-dippers' if their SBP was similar during day and night and 'reverse dippers' if their SBP increased at night. Participants were classified as hypertensive if their 24-hour blood pressure average was above 130/80mmHg. The relationship between dipping status, hypertension, WMH volume and cognitive outcomes was analyzed with a series of general linear models.
Results: In addition to a main effect of hypertension ($p<0.001$), there was an interaction ($p=0.002$) between hypertension and dipping status such that reverse dippers with hypertension had particularly elevated WMH volumes. Similarly, reverse dippers with hypertension had particularly lower short-term (hypertension X dipping status interaction, $p=0.013$) and total (hypertension X dipping status interaction, $p=0.040$) memory scores.
Conclusions: These findings suggest that the interaction between nocturnal dipping status and hypertension may promote small vessel cerebrovascular disease and impaired memory in older adults. Most importantly, these results point towards reverse dipping as potentially pathognomonic with negative outcomes for both normotensive and particularly hypertensive patients.
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M. DULAY, B. CERBONE, J.M. LAI, Y.J. ZHANG & G.W. BRITZ. Biopsychosocial predictors of depression after stroke.
Objective: Post-stroke depression occurs in a subset of individuals after stroke. Previous cross-sectional studies indicated that post-stroke depression can be predicted by cognitive impairment, stroke severity, history of depression prior to stroke, anxiety, location of stroke (left-sided), and physical disability. Using longitudinal data, this study evaluated what predicts residual major depression 17 months after stroke.
Participants and Methods: Forty-eight patients (average age of 59 years, range between 18-89 years) underwent neuropsychological and psychological assessment an average of 6.4 months after and 17.4 months after stroke. The Mini International Neuropsychiatric Inventory was used to diagnose major depression and anxiety disorders, and a standard neuropsychological test battery was administered.
Results: Major depression persisted in 25% of the same patients at month 6 and month 17, depression remitted in 12.5% of the patients between testing sessions, there was new onset in 14.6% of the patients by month 17, and depression was not present at either time point in 47.9% of the sample. Logistic regression indicated that the presence of an

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anxiety disorder at month 6 post-stroke, and the presence of executive function impairment and fatigue at month 17 were significant predictors of major depression 17 months after stroke (odds ratio p values < 0.05). Other month 6 variables did not predict month 17 depression, including side or focal location of stroke.

Conclusions: Results were consistent with previous cross-sectional studies regarding cognitive impairment and fatigue as predictors of depression after stroke. Results suggest that early identification of comorbid anxiety disorders in the first half-year after stroke would enable the prompt implementation of interventions diminishing the likelihood of future depression.

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N. DEMEYERE, J. MOLE, M.J. MOORE, G. CHIU, R. BASTING, E. SLAVKOVA, K. VANCLEEF & J. RIDDOCH. Post-Stroke Cognitive Trajectories and the Impact of Executive Switching Impairments on Overall Participation Outcomes.

Objective: This study investigated the trajectories of stroke specific cognitive impairments over 6 months and specifically asked whether early executive difficulties predicted participation in personally meaningful activities at six months post-stroke.

Participants and Methods: A consecutive sample of 315 stroke survivors were assessed with the Oxford Cognitive Screen (OCS) within 2 weeks of stroke onset and were followed up and re-assessed 6 months later. The OCS specifically measures 5 cognitive domains with high incidences of impairment post stroke: Language, Number, Praxis, Memory, and spatial and executive Attention. In addition to this brief cognitive measure, demographics and stroke specific information (e.g. lesion locations, Barthel Score) were collected. The assessment was repeated at 6 months, and self-reported questionnaire on activities of daily life and participation were recorded (Stroke Impact Scale).

A hierarchical multiple regression analysis investigated whether a significant amount of variance in the Stroke Impact Scale Participation subscale at follow-up was predicted by acute performance on the OCS executive functioning subtest (Trails task), over and above that predicted by acute functional severity (Barthel Index), a general cognitive screen (MoCA) and demographic variables (age, years of education and sex).

Results: Overall, incidences of impairment were much reduced, with the exception of verbal memory impairments. A strong model predicted levels of participation. Four predictor variables significantly contributed: Barthel Index scores, years of education, MoCA score and OCS Trails switching task. The executive switching measures did not mediate the relationship between MoCA scores and participation.

Conclusions: Significant post-stroke cognitive recovery was evident for all cognitive domains bar memory. A brief measure of executive switching in acute stroke predicted levels of participation 6 months later, over and above stroke severity and general cognitive screening.

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L.D. RUIZ, M. BROWN, Y. LI, L. JASON, S. ZENK & M. LAMAR. Socioeconomically Disadvantaged Neighborhoods, Stroke Risk, and Cognition in Older Adults: A focus on Violent Crime.

Objective: Individuals living in socioeconomically disadvantaged neighborhoods are significantly more likely to develop chronic health problems, including cardiovascular disease risk factors and stroke. These health problems are associated with reductions in cognition and increases in dementia and may help to explain disparities in brain aging. We investigated the association of neighborhood socioeconomic characteristics on stroke risk and cognitive outcomes.

Participants and Methods: Participants were non-demented community-dwelling older adults (N=121), who underwent neuropsychological and medical assessments. Cognitive domains most vulnerable to stroke risk were assessed, i.e., memory, attention/information processing (AIP), and executive function. Stroke risk was measured with the Framingham 10-year Stroke Risk Score (FSRP-10). Neighborhood socioeconomic characteristics were quantified at the census tract or point-level. Structural equation modeling (SEM) evaluated whether FSRP-10 mediated the relationship between neighborhood socioeconomic characteristics and cognition.

Results: Participants were approximately 65 years of age, 50% female, and 59% minority. Results of SEM accounting for neighborhood income, education, and employment levels revealed that higher rates of violent crime associated with higher FSRP-10 which then associated with lower AIP (RMSEA=.5). Violent crime did not associate with any other cognitive domain assessed.

Conclusions: Violent crime contributed to the relationship between 10-year stroke risk and AIP performance. Thus, higher crime rates associated with higher stroke risk, which in turn associated with slower AIP. Neighborhoods matter for physical and cognitive health and our findings emphasize the need to account for aspects of the environment during clinical interviews and cognitive assessments.

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B.C. STAMM, B. RIZVI, J.M. COLÓN, B. MAAS, K. IGWE, C.M. ABINADER, N. SCHUPF, R. MAYEUX, J.J. MANLY & A.M. BRICKMAN. Parental History of Dementia is Associated with Increased Cerebrovascular Disease.

Objective: Small vessel cerebrovascular damage, which typically manifests as white matter hyperintensities (WMH), is linked to risk and progression of Alzheimer's Disease (AD), but there is debate about whether it represents a core feature of the disease. Parental history of dementia is a risk factor AD, suggesting a strong genetic or heritable component; the extent to which parental dementia history is associated with cerebrovascular disease has not been examined, but could provide insight into the aggregation of AD and cerebrovascular disease. The purpose of this study was to determine whether older adults with a family history of dementia have increased cerebrovascular disease relative to those who do not.

Participants and Methods: We included 481 community older adults (mean age=74.0+5.8; 56% women) with available MRI scans and self-report parental history data of AD or dementia. Participants were classified as having a parental history (one/both parents) of AD/dementia or having no parental history. We compared WMH volume between the two groups, controlling for age, sex, total brain volume, vascular risk factors, and cognition.

Results: One hundred twelve participants reported having a parental history and 369 reported no parental history. The groups were similar in age, brain volume, vascular risk factors, and sex. Those with parental history had slightly higher cognitive test scores than those without (z=0.66+0.50 vs. z=0.53+0.58, p=0.021). Those with parental history of AD/dementia had greater total WMH volume than those without (1.25+0.11 vs. 1.00+0.06 log cm^3; F=4.173, p<0.05). Results were stronger when considering maternal versus paternal history.

Conclusions: Older adults with parental, particularly maternal, history of AD/dementia have increased cerebrovascular disease. The results highlights the possibility that cerebrovascular changes are a core feature of AD/dementia, as proband WMH severity and parental history aggregate together.

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M. WERHANE, K.R. THOMAS, K.J. BANGEN, A.J. WEIGAND, E.C. EDMONDS, D.A. NATION, E.E. SUNDERMANN, M. BONDI & L. DELANO-WOOD. Arterial Stiffening Moderates The Relationship Between Diabetes And White Matter Lesion Burden In Older Adults With Mild Cognitive Impairment.

Objective: Cerebrovascular dysfunction has been proposed as a possible mechanism underlying cognitive impairment in the context of diabetes mellitus (DM). Although magnetic resonance imaging (MRI) evidence of cerebrovascular disease is often observed in DM, the vascular dynamics underlying this pathology remain unclear. Thus, the present study assessed the independent and combined effects of DM status and pulse pressure (PP)—a proxy for arterial stiffening—on white matter lesion (WML) burden in cognitively normal (CN) older adults and those with mild cognitive impairment (MCI).

Participants and Methods: 614 older adults (mean age: 72.4 years) from the Alzheimer's Disease Neuroimaging Initiative were categorized into those with (DM+; CN: n=47; MCI: n=37) and without (DM-; CN: n=313; MCI: n=217) diabetes. Participants had a blood pressure (BP) assessment from which PP was derived (systolic BP-diastolic BP) and T2-FLAIR MRI to quantify WML burden. Multiple linear regression, adjusting for age, sex, BMI, intracranial volume, and APOE e4 status, examined the effects of DM status and PP on WML burden.

Results: PP and DM status were not independently associated with WML burden in the overall sample nor within cognitive subgroups ($ps>.05$). However, a significant DM status x PP interaction was observed within the MCI group ($p=.02$) such that higher PP values predicted more extensive WML pathology in the DM+ but not DM- group. No significant interaction was observed in the CN group ($p=.70$).

Conclusions: Results indicate that PP is positively associated with WML burden in diabetic older adults with MCI, but not their nondiabetic or CN counterparts. Our findings suggest that arterial stiffening may have a role in development of cerebrovascular pathology within the context of DM. Given the specificity of these findings to MCI, future exploration of the sensitivity of even earlier brain markers of vascular insufficiency (i.e., prior to macrostructural white matter changes) to the effects of DM and PP in CN individuals is warranted.

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Symposium 8. What can Studying Down Syndrome Teach us About Alzheimer's Disease?

Chair and Presenter: Adam M. Brickman

Presenters: Nicole Schupf, Patrick Lao, Benjamin Handen

4:00–5:30 p.m.

A.M. BRICKMAN, B. HANDEN, P. LAO & N. SCHUPF. What can studying Down syndrome teach us about Alzheimer's disease?

Virtually all adults with Down syndrome (DS) develop amyloid plaques and neurofibrillary tangles -- the hallmark pathological features of Alzheimer's disease (AD)-- by the time they are 40 and most manifest the clinical symptoms of AD by their mid-60s. Down syndrome is caused by trisomy of chromosome 21, which contains the amyloid precursor protein gene, and is considered a practically fully-penetrant genetic cause of early onset AD. However, there is a wide range of age of onset and a substantial proportion of adults with DS maintain their abilities even at older ages, suggesting that additional genetic, biological, and environmental factors of risk accelerate or slow disease progression. The life expectancy of individuals with DS has increased dramatically, which highlights both the need to understand how AD emerges in DS and the opportunity to study individuals with DS to inform our conceptualization of AD in the general population. The Alzheimer's Biomarker Consortium- Down Syndrome (ABC-DS) was established by the NIA and the NICHD to elucidate neuropsychological, neuroimaging, fluid, and genetic biomarkers that track progression to mild cognitive impairment and dementia in people with DS; to understand the pathways and their modifiers that link amyloid deposition to dementia; and to provide public access to data and biological samples. This symposium will feature investigators in the ABC-DS and focus on recent findings related to the AD-related epidemiology, neurobiology, and neuropsychology of DS. Dr. Schupf will present findings linking proteomic profiles to risk of MCI and AD in adults with DS. Dr. Lao will present on the current state of molecular PET biomarkers for AD in DS. Dr. Brickman will detail the involvement of cerebrovascular disease to AD in DS. Finally, Dr. Handen will discuss the neuropsychological profile of AD in DS and its neuroimaging correlates.

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N. SCHUPF, F. ZHANG, J. LEE, S. KRINSKY-MCHALE, W. ZIGMAN, W. SILVERMAN & S. O'BRYANT. Proteomic profiles of risk for incident mild cognitive impairment and Alzheimer's disease among adults with Down syndrome.

Objective: The high risk of Alzheimer's disease (AD) in adults with Down syndrome (DS) provides a unique platform for understanding the development of AD. Virtually all individuals with DS show the neuropathological changes of AD by age 40 and most will have developed AD by age 60, nearly 20 years earlier than in the general population, with a wide range of age at onset. Determining the risk factor, biomarker and genetic profiles of adults with DS can identify common and distinct profiles of risk. Here we conducted a proteomic study of adults with DS to predict incident mild cognitive impairment (MCI) and AD in this high risk population.

Participants and Methods: The study included 356 members of a community-based cohort of adults with DS. Proteomics were conducted on banked plasma samples via electrochemiluminescence from a previously generated algorithm. Support vector machine (SVM) analyses were utilized to create MCI- and AD-specific proteomic risk scores. Cox proportional hazards modeling examined the relation of the proteomic cut-scores to onset of MCI and AD, adjusting for age, sex, level of function, race/ethnicity and the *APOE* E4 allele.

Results: Of the 356 participants, 101 developed MCI, 83 developed dementia, and 273 remained nondemented over a 10 year follow-up period. The proteomic profile was highly accurate in predicting incident MCI (AUC = 0.93). The proteomic profile was also highly accurate in predicting incident AD (AUC=0.86). For MCI risk, the SVM-based cut-score yielded an adjusted hazard ratio (HR)=7.09 ($p< .001$). For AD risk, the SVM-based cut-score yielded an adjusted HR = 11.29 ($p< .001$).

Conclusions: The current results provide strong support for our blood-based proteomic profile for predicting risk for MCI and AD among adults with DS as well as relevance to the general population. It is noteworthy that the proteomic algorithms were heavily weighted towards inflammatory markers for both MCI and AD, similar to the general population.

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P. LAO, B. HANDEN, S. HARTLEY, A. COHEN, D. TUDORASCU, W. KLUNK, S. JOHNSON & B. CHRISTIAN. Image-based biomarkers of Alzheimer's-like pathophysiology in adults with Down syndrome without dementia.

Objective: The prevalence of Alzheimer's disease (AD) in Down syndrome (DS) is higher than in the general population. Triplication of chromosome 21 in DS is cauuses an over-production of gene products, such as amyloid precursor protein, leading to an early accumulation of amyloid-β plaques. The recent NIA-AA research framework suggests that elevated amyloid represents AD change, additional presence of

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elevated neurofibrillary tangles represents being on the AD continuum, and neurodegeneration represents disease severity. A natural history study of AD pathophysiological change in DS informs potential therapeutics for AD in both DS and the general population.
Participants and Methods: 68 DS adults (33-59yrs) underwent functional and structural imaging and neuropsychological testing. Amyloid burden was assessed with [^{11}C]Pittsburgh compound B (PiB) as a continuous and dichotomous (e.g., PiB positivity) measure, neuronal function was assessed with [^{18}F]FDG PET, and gray matter volume was assessed with structural T1 MR imaging.
Results: At baseline, 23% were considered PiB(+) with the youngest PiB(+) subject at 36yrs. In the PiB(+) group, the pattern of amyloid accumulation was striatum-dominant. There was an AD-like pattern of hypometabolism, but no significant hypometabolism in the striatum. Longitudinally, participants that remained PiB negative demonstrated a low rate of amyloid accumulation (0.5%/yr), those who converted to PiB positive had the fastest rate (4.9%/yr), and those who remained PiB positive had a slowing rate (3.6%/yr). Atrophy was not significant in this young, cohort without dementia, but tended to be more progressive from stable PiB negative to stable PiB positive.
Conclusions: AD-like pathophysiological changes occur at an earlier age in DS with a striatum-dominant amyloid pattern. Ongoing longitudinal scans will determine the extent to which the amyloid pattern affects downstream changes in tau accumulation, glucose metabolism, atrophy, and cognition.
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A.M. BRICKMAN, B. RIZVI, J. GUTIERREZ, M. YASSA, H. ROSAS, F. LAI, I. LOTT & N. SCHUPF. Examining Alzheimer's-related cerebrovascular disease in Down syndrome.
Objective: There is a growing appreciation for the role of cerebrovascular change in the clinical presentation of Alzheimer's disease (AD) and debate about its role in disease pathogenesis. Most adults with Down syndrome (DS) develop primary AD pathology by their 40s and dementia by their 60s. Unlike in the general population, individuals with DS have low prevalence of vascular risk factors, providing an opportunity to study cerebrovascular disease in AD without the confound of systemic vascular disease. This presentation will discuss recent findings from MRI studies among individuals enrolled in the Alzheimer's Disease in Down Syndrome (ADDS) study.
Participants and Methods: To date, 107 older adults with DS (mean age=62+/-7, 45% women) enrolled in ADDS have received magnetic resonance imaging (MRI) and clinical evaluation. Cerebrovascular disease was defined total and regional white matter hyperintensity (WMH) volume, severity of enlarged perivascular spaces, presence of infarct, and presence of microbleeds. Each marker was compared across participant groups defined as without dementia, mild cognitive impairment (MCI), or dementia.
Results: Individuals with dementia and MCI had elevated WMH volume (particularly in parietal and frontal regions), were more likely to have infarcts and microbleeds, and had dramatically enlarged perivascular spaces relative to those without dementia. In most cases, the severity of cerebrovascular disease among those with MCI was intermediate between those without dementia and those with dementia.
Conclusions: Cerebrovascular disease is a prominent feature of AD among adults with DS, suggesting that it is a key driver of symptom presentation and possibly pathogenesis. Evidence of a role of cerebrovascular disease among populations at particularly high genetic risk for AD highlights new possible therapeutic targets and directions for the study of the neurobiology of AD.
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B. HANDEN, S. HARTLEY, D. TUDORASCU, D. DEVENNY, W. KLUNK & B. CHRISTIAN. Cognitive correlates of amyloid PET in Down syndrome.
Objective: Amyloid-β (Aβ) accumulation may be a contributor to or relevant biomarker of early declines in preclinical stages of Alzheimer's Disease (AD) in Down syndrome (DS). Adults with DS are at increased risk for AD, with most individuals exhibiting AD neuropathology by age 50; over half exhibit clinical symptoms by age 60. This increased risk is due to the overproduction of Aβ, resulting from the triplication of chromosome 21, which contains the gene for the amyloid precursor protein. We examined changes in cognitive functioning related to Aβ following 3 assessment cycles of an 8 year longitudinal study of healthy adults with DS.
Participants and Methods: 81 healthy adults (33-59 years) with DS were assessed at baseline and returned for a second (N=69) and third (N=49) cycle (assessments 2-3 years apart). An extensive neuropsychological battery, MRI scans, and PET scans using [^{11}C] Pittsburgh compound B (PiB) were administered at each cycle. Using PiB retention assessed in 6 neocortical brain regions, participants were categorized as *continuously PiB-*, *continuously PiB+*, or *converter from PiB- to PiB+*.
Results: Increased global PiB retention was associated with declines in verbal episodic and visual memory, visuospatial construction, and fine motor processing speed after controlling for chronological age. Those consistently PiB+ demonstrated declines in episodic memory, whereas those consistently PiB- exhibited stable or improved performance.
Conclusions: This is one of the first longitudinal examinations of the association between Aβ accumulation and cognitive functioning prior to the clinical onset of AD in adults with DS. An increase in global Aβ was found to be related to decreased cognitive functioning in a number of areas, beyond normative aging. The presence of subtle changes in functioning may serve as a possible predictor of future cognitive impairment/AD and also might represent a potential outcome measure for AD prevention trials in DS.
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Plenary C. Generation of New Hippocampal Neurons in the Adult Brain: Implications for Mental Health

Presenter: Sandrine Thuret

5:30–6:30 p.m.

S. THURET. Generation of New Hippocampal Neurons in the Adult Brain: Implications for Mental Health.
The adult mammalian brain can generate new neurons throughout life via the existence of small and sparse populations of neural stem cells dividing and differentiating into neurons. The hippocampus is one of the rare areas of the adult human brain where neurogenesis persists. During this plenary session we will explore how adult hippocampal neurogenesis is implicated in memory formation and mood regulation. We will also explore the environmental and molecular regulatory mechanisms controlling neural stem cell fate and show evidence that this hippocampal cellular population and neurogenesis can be used as targets for environmental prevention and pharmacological intervention aimed at cognitive decline and mood disorders. As a result of participation in this session, the audience will achieve the following learning outcomes: (1) Summarise the concept of adult neurogenesis. (3) Discuss the possible functions of adult hippocampal neurogenesis. (4) Discuss factors that can influence adult hippocampal neurogenesis.
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FRIDAY MORNING, FEBRUARY 22, 2019

CE Workshop 9. The Wellbeing of Caregivers of People with Dementia Considered from a Neuropsychological Perspective

Presenter: Robin G. Morris

7:20–8:50 a.m.

R.G. MORRIS. The Wellbeing of Caregivers of People with Dementia Considered from a Neuropsychological Perspective.
Dementia is an umbrella term used for a range of neurological conditions that include resulting in progressive and widespread neuropsychological impairment. The experience of dementia is linked strongly to the caregiving processes with most care provided by informal caregivers, at least in the early stages of illness. The course will consider what factors impinge the psychological wellbeing of caregiver also considering caregiving in different conditions, such Alzheimer's disease and the behavioural variant of frontotemporal dementia. It will also consider the factors that help caregivers to 'live well' with the experience of dementia and the stresses and strains of caregiving, including the psychological factors that impinge on care and the features of the person with dementia. The course will also cover ways of supporting caregivers in the light of what about such factors.
As a result of course participation it is intended those attending will achieve the following objectives: (1) be able to describe the factors that can impact on caregiver wellbeing, including how these may vary according to carer and the person with dementia characteristics and: (2) be able to discuss the empirical work determining best outcomes in approaches to supporting caregivers. The course is orientated to those with intermediate knowledge of this topic.
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CE Workshop 10. Air Pollution and the Adult Brain: Impact on Cognition, Dementia, and Mood

Presenter: Melinda C. Power

7:20–8:50 a.m.

M.C. POWER. Air Pollution and the Adult Brain: Impact on Cognition, Dementia, and Mood.
Environmental pollutants can affect many aspects of human health. The impact of pollutants on brain health is an area of active research. This workshop will review what we know about the relationship between one common and ubiquitous environmental pollutant, air pollution, and adult cognitive and mental health. First, we will begin with an introduction to how we study health effects of air pollution. Second, we will provide an overview of the mechanisms by which air pollution may adversely impact the human brain. Third, we will examine the potential impact of air pollution exposures on adult cognitive health, including cognitive status, cognitive change, incident dementia, and common pathologies related to cognitive impairment. Fourth, we will consider the potential impact of air pollution exposure on adult anxiety, depression, and suicide. Finally, we will conclude with a discussion of the relevance of the population-level research on this topic to the work of clinicians and clinical care settings. As a result of participation in this course, the learner will be able to (1) explain how population-level studies assess the potential impact of air pollution on adult cognitive or mental health (2) describe what is known about the relationship between air pollution exposures and adult cognitive and mental health. Given the ubiquitous nature of environmental exposures, one goal of this workshop is to increase awareness and interest in the role of the environment on the state of adult cognitive and mental health.
Correspondence: *Melinda C. Power, ScD, Epidemiology and Biostatistics, George Washington University, 950 New Hampshire Ave NW, Suite 500, Washington, District of Columbia 20052, United States. E-mail: power@email.gwu.edu*

Early Career Award Presentation: Neural Correlates of Learning and Outcome Processing in Multiple Sclerosis and Traumatic Brain Injury

Award Recipient: Ekaterina Dobryakova

8:00–9:00 a.m.

E. DOBRYAKOVA. Neural Correlates of Learning and Outcome Processing in Multiple Sclerosis and Traumatic Brain Injury.
Learning is an essential aspect of cognition required for successful execution of many daily activities and is an essential component of adaptive behavior. Effective learning is often reliant on clear feedback and the ability to learn from feedback or action outcomes. Feedback is also an integral part of the rehabilitation environment. While this dopamine-dependent process has been shown to be impaired in various clinical populations such as in individuals with schizophrenia, Parkinson's disease, etc., this topic has been largely neglected in multiple sclerosis (MS) and traumatic brain injury (TBI). In my work I am addressing this knowledge gap by examining how individuals with TBI and MS learn from feedback and how the fronto-striatal brain regions are engaged during feedback processing. The results suggest that feedback processing can be considered more effortful for these clinical populations.
Fatigue is another dopamine-dependent construct that has been shown to rely on the fronto-striatal brain regions and is a symptom that individuals with MS and TBI often experience. Given this neural common denominator between fatigue and outcome processing, I investigated whether fatigue can be reduced through engaging individuals with MS and TBI in a goal-directed behavior, showing that fatigue can be reduced through outcome presentation.
Correspondence: *Ekaterina Dobryakova, Ph.D, Kessler Foundation, 120 Eagle Rock ave, 120 Eagle Rock ave, East Hanover, NJ 07936, United States. E-mail: edobryakova@kesslerfoundation.org*

Plenary D. Individual Pathways of Resilience to Alzheimer's Disease: Embracing Complexity

Presenter: Timothy J. Hohman

9:00–10:00 a.m.

T.J. HOHMAN. Individual Pathways of Resilience to Alzheimer's Disease: Embracing Complexity.
There is tremendous interindividual variability in the neuropathological and clinical presentation of Alzheimer's disease (AD). This heterogeneity in AD onset and progression represents a central challenge to the field, but also provides a unique opportunity to explore ways in which individual differences contribute to AD risk and resilience. This talk will demonstrate how modern statistical approaches can be leveraged to harness the heterogeneity in a complex disease like AD to identify novel treatment targets and help move the field towards precision

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interventions. The objectives of this presentation are to (1) describe how to build robust resilience phenotypes using advanced statistical approaches, (2) demonstrate how resilience metrics can be leveraged to identify novel treatment targets for AD, (3) explore sex as a central biological variable in AD, and (4) demonstrate how sex differences in AD inform genetic models of resilience.
Correspondence: *Timothy J. Hohman, PhD, Neurology, Vanderbilt University Medical Center, Vanderbilt Memory & Alzheimer's Center, 1207 17th Ave S, Suite 204F, Nashville, TN 37212, United States. E-mail: timothy.j.hohman@vumc.org*

AM Coffee Break Sponsored by Kessler Foundation

10:00–10:15 a.m.

Poster Session 6. Cancer, Epilepsy, & Genetic Disorders Across the Lifespan

10:15–11:30 a.m.

Cancer

C. BAREFOOT, L. SYKES TOTTENHAM & R. MACLENNAN. A Meta-Analysis of Psychological and Cognitive Outcomes Following Chemotherapy.
Objective: Changes in cognitive function are common complaints following chemotherapy; however, the relationship between objective (neuropsychological tests) and subjective reports of cognitive dysfunction is debated. Depression and anxiety have been proposed to account for some of this discrepancy. The purpose of this meta-analysis was to examine the incidence of depression and anxiety in participants of studies that examined objective and subjective measures of cognitive function following chemotherapy.
Participants and Methods: A meta-analysis was conducted of 9 studies using random effects models to compare groups treated with chemotherapy to their pre-chemotherapy baseline, cancer controls, or healthy controls; between- and within-subjects designs were analyzed separately. Heterogeneity, risk of bias, and quality of evidence were assessed for each outcome.
Results: Groups treated with chemotherapy had higher depression scores when compared with healthy controls but not cancer controls or pre-chemotherapy scores. Although none of the anxiety analyses reached significance, pre-chemotherapy scores were higher than scores post-chemotherapy. Examination of subjective cognitive function showed no effect of chemotherapy, whereas a number of significant results were found for outcomes assessed using objective neuropsychological tests.
Conclusions: The expected subjective-objective discrepancy was found, but unexpectedly objective measures showed effects of chemotherapy whereas subjective measures did not. Further, groups treated with chemotherapy experienced worse depression than their healthy counterparts, corresponding with lower cognitive scores in this group. A non-significant trend towards worse anxiety pre-chemotherapy was found and corresponded with improvement in cognitive function post-chemotherapy in within-subject designs.
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E. BARLOW-KRELINA, Y. CHEN, Y. YASUI, T.M. GIBSON, K.K. NESS, W.M. LEISENRING, R.M. HOWELL, P.C. NATHAN, K.C. OEFFINGER, L.L. ROBISON, G.T. ARMSTRONG, K.R. KRULL & K. EDELSTEIN. Physical activity and neurocognitive outcomes in adult survivors of childhood cancers: A report from the Childhood Cancer Survivor Study (CCSS).
Objective: To investigate associations between physical activity (PA) and neurocognitive outcomes in adult survivors of childhood cancer.
Participants and Methods: 12,294 5-year survivors diagnosed between 1970-1999 (median [range] age at diagnosis 8[0-21] years, time from diagnosis 23[15-34] years), and 727 siblings self-reported PA and completed the Neurocognitive Questionnaire (NCQ), a measure of Task Efficiency (TE), Emotion Regulation (ER), Organization (ORG) and Memory (MEM). PA was collected at baseline, and PA and NCQ data were obtained 7[1-12] years later. 4621 survivors completed another follow-up 12[9-14] years later. PA was defined as consistency in meeting the Centers for Disease Control and Prevention criteria (i.e., ≥ 75 min vigorous or 150 min moderate activity/week) across surveys. Associations between PA and NCQ scores and change in NCQ scores were assessed using multiple linear regression stratified on CNS tumor status. Potential mediating effects of body mass index (BMI) and severe chronic health conditions (CHCs) were explored.
Results: Survivors were less likely to report consistent PA (26% vs. 32%, $p< 0.001$) and were at risk for more neurocognitive symptoms than siblings (TE: CNS, β=12.3, $p<.001$; non-CNS, β=3.34, $p<.001$; MEM: CNS, β=4.3, $p=.01$; non-CNS, β=1.8, $p=.04$). Consistent PA over time was associated with fewer symptoms compared to consistent inactivity (TE: CNS, β=-3.0, $p=.002$; non-CNS, β=-3.1, $p<.001$). CNS survivors benefited from consistent PA to a greater extent than siblings (TE: β=-4.0, $p=.002$; MEM: β=-2.7, $p=.03$). BMI and CHCs partially mediated the impact of PA, but the effects were small (change in $\beta<.65$, $p\leq.01$). Consistent PA was associated with improved neurocognitive symptoms over time across all domains, in both survivor groups ($p\leq.05$).
Conclusions: Adult survivors of childhood cancer who report more consistent PA have fewer neurocognitive symptoms and larger improvements in symptoms many years after treatment.
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E. BUTTERBROD, J. BRUIJN, M. BRAAKSMA, G. RUTTEN, C. TIJSSEN, M. HANSE, K. GEHRING & M.M. SITSKOORN. Predicting Disease Progression in Newly Diagnosed High-Grade Glioma with Cognitive Parameters: The Value of Longitudinal Patient-Specific Neuropsychological Assessment.
Objective: To investigate to what extent post-surgical cognitive decline on a subset of patient-tailored neuropsychological tests predicts disease progression on radiological grounds in individuals with newly diagnosed high-grade glioma (HGG).
Participants and Methods: 35 patients who underwent resection for confirmed HGG were included. Neuropsychological assessment, including the CNS Vital Signs battery, Letter Fluency and Digit Span test, and clinical radiological evaluation with MRI, were conducted 3-monthly, starting 1 day before surgery. For each patient, we selected the 3 tests that showed the highest Reliable Change Index (RCI), i.e. most improvement, from pre- to first post-surgical assessment for further monitoring over time. Follow-up assessments continued for up to 24 months after surgery or until disease progression. An RCI value of ≤ -1 on at least 2 of the 3 selected tests at any of the follow up assessments was considered cognitive decline. A discrete Cox proportional hazard model with dichotomous time-dependent coefficient (cognitive decline) to predict radiological disease progression was conducted in R.
Results: 25 patients were eligible for analysis. Cognitive decline preceded or had occurred at time of progression in 10 of the 15 patients (67%) who showed radiological disease progression during follow up, and was absent in 8 out of 10 patients (80%) who did not show disease progression. The model showed a hazard ratio (HR) for disease progression of 4.144; 95% CI 1.388 - 12.37, $p= .01$ (model $\chi2$ [1] = 7.02, $p<.01$).

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Conclusions: Our data suggested a four-fold increase in risk of disease progression if the change on patient-specific tests during follow up met the criterion for cognitive decline. We recommend further exploration of the value of patient-tailored, brief longitudinal neuropsychological assessment alongside current methods for disease monitoring.
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B.E. CLARK & S. HALL. Financial Difficulties Predict Subjective Cognitive Impairment After Chemotherapy.
Objective: Cancer patients often cite cognitive problems after chemotherapy. This study examined how well five variables (Age, Time Since Treatment, Treatment Length, Perceived Cognitive Impairments on the Functional Assessment of Cancer Therapy – Cognitive Functioning (FACT-Cog), and Financial Difficulties) predicted subjective cognitive impairment (SCI) as measured by the Cognitive Difficulties Scale (CDS). Remarkably, Financial Difficulties best predicted SCI. Understanding the complex relationships between biological, treatment-related, and social variables is critical to anticipating which patients are more likely to experience SCI and how best to address these concerns.
Participants and Methods: Adult participants (n = 55) who had completed chemotherapy treatment were recruited from an outpatient cancer center in the Northwest. Participants completed a demographic survey followed by the FACT-Cog, the COST; a Functional Assessment of Chronic Illness Therapy (FACIT) measure of financial well-being, and the CDS.
Results: Simultaneous multiple regression was used to test if the five variables significantly predicted SCI. Results indicated that the model explained 32.0% of the variance, and that the model was a significant predictor of SCI, $F(5,48) = 4.52$, $p = .002$. Financial Difficulties best predicted SCI and was statistically significant (B = -.50, $p = .001$).
Conclusions: Results revealed that low levels of financial well-being were strongly associated with high levels of SCI. To our knowledge, this link has not been examined in the literature and merits a full inquiry. These findings illustrate that many variables likely contribute to SCI, and that patients' financial status may play a greater role than previously expected. Patients' cognitive complaints must be viewed within a larger context in order to provide appropriate interventions that are tailored to each individual.
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H.M. CONKLIN, J. ASHFORD, K. CLARK, K. MARTIN-ELBAHESH, K.K. HARDY, V.W. WILLARD, T.E. MERCHANT, S. JEHA, F. WANG & H. ZHANG. Cognitive Gains following Computerized Cognitive Training Fail to Generalize to Improved Social Skills among Childhood Cancer Survivors.
Objective: Children with cancer who receive central nervous system (CNS)-directed therapy are at risk for cognitive and social skills deficits. We previously showed computerized cognitive training results in significant improvement in attention, working memory (WM) and processing speed for this population. We investigated whether these cognitive gains lead to secondary improvements in social skills.
Participants and Methods: Sixty-eight survivors of childhood acute lymphoblastic leukemia (ALL) or brain tumor (BT) with identified WM deficits were randomly assigned to a computerized WM intervention (23 ALL/11 BT, age= 12.21±2.47) or a wait-list control group (24 ALL/10 BT, age= 11.82±2.42). The intervention group was asked to complete 25 training sessions at home with weekly, phone-based coaching. Conners 3-Parent Report (Peer Relations) and Self-Report (Family Relations) were completed pre-intervention, immediately post-intervention and 6 months post-intervention.
Results: Thirty (88%) of participants randomized to intervention completed at least 20 of 25 training sessions. Social skills of these participants were compared to the control group using piecewise linear mixed effects-modeling. There were no significant differences in Peer Relations between groups at baseline, and no difference in change in Peer Relations between groups from pre- to immediate post-intervention or post- to 6 months post-intervention ($ps > .40$). Baseline Family Relations was significantly elevated (more problems) in the control group relative to the intervention group ($p < .01$), with a significantly greater decline from pre- to immediate post-intervention in the control group ($p < .05$) and no difference in change between groups from post- to 6 months post-intervention ($p > .80$).
Conclusions: Study results suggest gains in executive functioning from computerized WM training do not generalize to social skills benefits. Training focused on social aspects of cognitive processing (e.g., affect recognition or social problem solving) might be more efficacious.
Correspondence: *Heather M. Conklin, PhD, Psychology, St. Jude Children's Research Hospital, 262 Danny Thomas Place, MS# 740, Memphis, TN 38105, United States. E-mail: heather.conklin@stjude.org*

J.A. EASTMAN, K.I. ALPERT, J. WASHBURN & L. WANG. History of Remote Cancer Diagnosis and Neuroanatomical Correlates in Older Adults: The Link Between Cancer- Related Cognitive Impairment and Preclinical Alzheimer's Dementia.
Objective: Older adults with a cancer history may experience additive and persistent neuroanatomical changes due to both cancer-related cognitive impairment (CRCI) and preclinical Alzheimer's dementia (AD) called mild cognitive impairment (MCI). This analysis examined if a history of remote cancer is associated with greater cortical atrophy in the prefrontal cortex (PFC) and/or hippocampal volume loss in older adults with MCI.
Participants and Methods: We analyzed MR data from cognitively normal, older adults with (CN-CA; N=94) and without (CN; N=305) a history of cancer, as well as MCI diagnosed, older adults with (MCI-CA; N=139) and without (MCI; N=558) a history of cancer. Subjects were identified through a review of records from the Alzheimer's Disease Neuroimaging Initiative. T-1 weighted MR scans were processed using the FreeSurfer software suite (Version 5.3.0). Hippocampal volume and cortical thickness for six regions of the PFC (Desikan-Killiany Atlas, 2006) were assessed using MANCOVA corrected for multiple comparisons (Thickness= $p < 0.008$; Volume=$p < 0.05$), and covaried for age and sex.
Results: There was a statistically significant difference among groups for cortical thickness and hippocampal volume ($p < 0.001$). Comparisons revealed no significant differences between CN-CA and CN participants. Compared to ***all*** other groups, MCI-CA showed significant left hippocampal volume loss ($p < 0.01$); significant cortical atrophy of left pars triangularis ($p < 0.008$); and significant and trending ($p < 0.05$) atrophy of left pars opercularis, right superior frontal, right pars triangularis, and right pars orbitalis.
Conclusions: Results suggest that PFC and left hippocampal integrity are more compromised in older adults with MCI and a remote history of cancer, indicating additive, adverse effects. This could be a mechanism of persistent CRCI, and may indicate a link between vulnerability for persistent CRCI and AD. Future research should include longitudinal analyses of neuroanatomical and cognitive trajectories in these patients.
Correspondence: *Jennifer A. Eastman, M.A., Psychiatry, Northwestern University, 710 N. Lakeshore Dr., #1204, Chicago, IL 60640, United States. E-mail: jeastman@u.northwestern.edu*

J.A. EASTMAN. History of Cancer Diagnosis and Cognitive Function in Older Adults: Examining Cancer-Related Cognitive Impairment and Preclinical Alzheimer's Dementia.
Objective: Older adults with a cancer history may experience persistent cognitive changes due to cancer-related cognitive impairment (CRCI) and/or preclinical Alzheimer's dementia (AD) called mild cognitive impairment (MCI). This analysis examined if a history of remote cancer is associated with greater cognitive decline in older adults with and without MCI.

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Participants and Methods: We conducted a secondary analysis of data from cognitively normal (CN) and MCI diagnosed, older adults with (CN-CA, *N*=86; MCI-CA, *N*=128) and without (CN, *N*=278; MCI, *N*=513) a history of cancer. Subjects were identified through a review of records in the Alzheimer Disease Neuroimaging Initiative. Scores on cognitive tests were transformed using regression and corrected for age, education, and sex. Resulting *z*-scores were averaged into three composite scores: Unstructured Verbal Memory (UVM- Rey Auditory Verbal Learning Test), Attention/Processing Speed (APS- Trail Making Test/number cancellation), and Language (LNG- Boston Naming Test/ Fluency). Linear mixed models corrected for multiple comparisons ($p < 0.017$) examined differences in performance by cancer history and cognitive status.
Results: There was a significant interaction between remote cancer history and cognitive status for UVM ($p < 0.001$). UVM was significantly reduced in the MCI group compared to ***all*** other groups ($p < 0.011$), while MCI-CA was only reduced compared to CN-CA and CN ($p < 0.001$). Comparisons revealed no significant cognitive differences between CN-CA and CN participants.
Conclusions: Results suggest that adults with remote cancer history do not evidence significantly greater cognitive changes than their cognitively matched peers. However, MCI-CA may experience a reduced pattern of verbal memory changes compared to MCI which could indicate a better prognosis. Future research should include longitudinal analyses of neuroanatomical and cognitive trajectories in these patients to determine if there are long-term changes associated with comorbid CRCI and MCI in older adults.
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C.L. EVANS, J. GRIECO, Y. GARCIA & M. PULSIFER. Expressive and Receptive Language Functioning Following Proton Radiation Therapy for Pediatric Brain Tumor.
Objective: Conventional photon radiation has a detrimental effect on cognitive function of children treated for brain tumor (BT). Intelligence (IQ) and language deficits following treatment are commonly reported in the literature. Proton radiation (PRT) relatively spares surrounding tissue and may be less detrimental to cognition. This study examines change in IQ, expressive, and receptive vocabulary at baseline (BL) and follow-up (FU) in relation to extent of radiation, tumor location, and relevant clinical variables (e.g., hydrocephalus) in a large sample of children treated with PRT for BT.
Participants and Methods: 92 patients (M_{ageBL}=9.39, SD=4.58) received PRT for BT. 49% had supratentorial tumors and 46% received whole brain PRT. Patients were administered age-appropriate measures of IQ (Weschler FSIQ), expressive vocab (EOWPVT-4), and receptive vocab (PPVT-4) at BL and FU ($M_{Interval}$=3.48 years). Change scores for outcome measures from BL to FU were calculated. ANOVAs were performed to examine the effect of extent of radiation, tumor location, and hydrocephalus on change in scores at BL and FU.
Results: Neither extent of radiation nor tumor location was significantly associated with change scores for outcome measures. IQ, verbal IQ (VIQ), expressive, and receptive vocab scores were all evenly developed and within the average range compared to same-aged peers at FU (M_{FSIQ}=105.76, SD=14.41; M_{VIQ}=105.48, SD=13.51; M_{REC}=105.68, SD=13.64; M_{EXP}=105.72, SD=12.96). Hydrocephalus was associated with receptive [F(1, 81)=4.19, p=.04] but not expressive measures at FU; however, these scores were still within the average range (M=101.18, SD=14.25).
Conclusions: Approximately three and a half years following PRT for BT, children's intelligence and language scores remained relatively stable and in the normal range compared to age-based peers. Neither extent of radiation nor tumor location was significantly related to change in IQ, expressive, or receptive vocab scores. Language results are favorable to those in the photon literature.
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J.W. HARTZELL, S. SANGERMANO, D.M. BOSELLI & P. MEADORS. Cancer Patients' Subjective Cognitive Distress and Utilization of Neuropsychological Services.
Objective: The purpose of this study was to retrospectively examine level of distress about cognitive functioning in outpatients at a large, multi-site cancer institute. An electronic distress screening (EDS) solution was developed to provide instant PROs for physical and psychological symptoms during initial consultation. "Cognitive distress" was defined by patient's subjective rating of problems with memory and concentration in the last two weeks. Differences in cognitive distress between cancer patients referred to neuropsychology following EDS and cancer patients not referred were also examined to understand clinical appropriateness of utilization of neuropsychological services.
Participants and Methods: EDS has 39 questions, including 4 brief evidence-based scales, 11-symptom scales (0-10), and content areas covering distress, cancer symptoms/side effects, malnutrition, depression, anxiety, social/family support, financial, and spiritual concerns. 14,238 unique cancer patients were screened in 2017. Cognitive distress reported by cancer patients who were referred to neuropsychology (N=65) was compared to that of the remaining population (N=14,173) using measures of central tendency and Wilcoxon-rank sum test.
Results: Cognitive distress of the overall sample was low, with mean subjective rating of 2.0 (SD=2.7) and median of 0 (range [0,10]). Distress of sample not referred to neuropsychology was also low and did not differ from that of the overall population, with mean subjective rating of 2.0 (SD=2.7) and median of 0 (range [0,10]). Cognitive distress of patients who were referred to neuropsychology was significantly higher (p<0.001), with mean subjective rating of 5.1 (SD=3.0) and median of 6 (range [0,10]).
Conclusions: Cognitive distress of cancer outpatients referred to neuropsychology was significantly higher than the remaining population of patients, suggesting appropriateness of clinical service utilization. Future work should validate a numeric threshold for cognitive distress on EDS as a referral pathway.
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A. HEITZER, J. ASHFORD, C. HASTINGS, A. LIU, S. WU, J. BASS, R. VESTAL, M. HOEHN, J. CHIANG, Y. GHAZWANI, S. ACHARYA, F. BOOP, T.E. MERCHANT, A. GAJJAR, I. QADDOUMI & H.M. CONKLIN. Neuropsychological Outcomes of Patients with Low-Grade Glioma Brain Tumors Diagnosed During the First Year of Life.
Objective: Low-grade gliomas (LGG) are a heterogeneous group of tumors comprising approximately 40% of central nervous system tumors in children. They are frequently assumed to have a benign course; however, children diagnosed and treated at a young age are at increased risk for neurodevelopmental disruption.
Participants and Methods: Retrospective review revealed 51 patients with LGG diagnosed before 12 months of age managed at St. Jude Children's Research Hospital from 1986-2013. 25 of the 51 patients received a cognitive assessment (68% male; 6.8 ± 3.3 months at diagnosis; 10.5 ± 4.8 years at latest cognitive assessment). Most tumors were supratentorial (N=21). Approximately half the sample received radiation therapy (N=12; 4.0 + 3.0 years at radiation exposure), with an average of 1.7 chemotherapy regimens and 1.4 tumor directed surgeries.
Results: Chi-square analyses revealed performance below age expectations on measures of IQ, verbal memory, reading, mathematics, and bilateral fine motor functioning as well as parent-report of attention, executive, and adaptive functioning (*ps*<0.05). Parent-report of

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externalizing and internalizing behaviors as well as behavioral regulation were within age expectations. Children with supratentorial tumors had lower IQ scores and were rated by their parents as having greater adaptive skill deficits ($ps<0.05$). Greater number of chemotherapy regimens was associated with lower scores on measures of IQ, reading, mathematics, and adaptive functioning ($ps<0.05$). More tumor directed surgeries was associated with poorer performance on measures of mathematics and dominant hand fine motor control ($ps<0.05$). Radiation therapy exposure had no impact on neuropsychological performance but was associated with parent report of attention problems.
Conclusions: Children diagnosed with LGG in their first year of life experience a multitude of neuropsychological deficits. Identified risk factors (e.g., tumor location and treatment approach) may be useful in treatment planning and caregiver education.
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A.M. HENNEGHAN, N. OSIER, M. PETERSEN & K. SHELLI. Amyloid Beta and Cognitive Performance of Breast Cancer Survivors.
Objective: Growing evidence supports that accelerated brain age is an underlying mechanism of cancer-related cognitive impairment (CRCI). Accelerated brain aging can result from neurodegenerative processes, including the accumulation of neuropeptides such as amyloid beta (Aβ). However, no studies to date have evaluated Aβin relation to CRCI. The objective of this study was to explore associations between serum Aβ concentrations and cognitive performance in breast cancer survivors up to 10 years post chemotherapy completion.
Participants and Methods: Women with a history of non-metastatic breast cancer and without inflammatory comorbidities were recruited for this study. 36 breast cancer survivors (mean age 51.41 ±8.8) completed data collection and were included in the study. Data collection included self-report surveys (psychosocial factors), cognitive testing (COWA, HVLT-Immediate & Delay, TMT A & B), and non-fasting blood draws (Aβ-42). Cognitive test scores were adjusted for age and education. Blood Samples were run in triplicate using an ultra-sensitive sandwich-based immunoassay (SMCxPRO, MilliporeSigma). Data were analyzed cross-sectionally using Pearson's correlations.
Results: Participants completed data collection and were on average 3 years post adjuvant treatment. Significant relationships were found between Aβ-42 concentrations and HVLT-immediate (r=-.48, p=.003), HVLT-delayed (r=-.40, p=.016), and TMT B (r=-.43, p=.009). No relationships were detected between self-reported measures and Aβ-42.
Conclusions: Our findings suggest that higher peripheral concentrations of Aβ-42 are associated with lower performance across measures of immediate and delayed memory as well as executive functioning. The findings of this exploratory study are unique to the field of cancer and cognition and provide preliminary evidence of neurodegenerative processes underlying CRCI. Future research should evaluate these relationships in a larger sample.
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L. JACOLA, L. HALL, L. WHITE, H.M. CONKLIN, C. PUI & S. JEHA. Predicting the Need for Educational Services in Survivors of Childhood Acute Lymphoblastic Leukemia (ALL): The Role of On-Therapy Serial Neurocognitive Monitoring.
Objective: Survivors of childhood ALL are at risk for neurocognitive deficits that predict lower quality of life. Variability in outcomes is not well understood, despite known risk factors, including greater therapy intensity and younger age at diagnosis. In this retrospective study, we examined the utility of neurocognitive testing during treatment to predict need for school services (IEP or 504 plan) in survivorship.
Participants and Methods: As part of study planning, a semi-structured interview was completed with the parents of 61 survivors treated on 2 consecutive risk-adapted frontline therapy protocols: 29 in TOTXV and 32 in TOTXVI. Recruitment was stratified by treatment arm and age at diagnosis. Parents answered questions about need for academic supports. Surveys were conducted 3-7 years after treatment completion. Protocol-directed neurocognitive assessments, including estimated IQ (EIQ, Stanford-Binet or Wechsler), attention (CPT) and learning/memory (CVLT) were obtained at 6 months after diagnosis (Reinduction; RE) and at the end of 2.5 years of therapy (ET). Frequency comparisons and ANOVA were used for analysis. All p-values are 2-sided.
Results: In the overall group, 53% were male, 39% were <5 years at diagnosis (range = 0.67-18.5), and 49% were low-risk. Forty-four percent of survivors had school plans; of these, 96% were initiated after diagnosis. School plan frequency did not significantly differ by protocol, risk arm, or age at diagnosis (p's≥.10). Assessment data were available for 57% at RE and 64% at ET. Compared to survivors with no school plan, survivors with plans had lower EIQ scores (Mean [M]=107.05, 97.13; d=0.71; p=.04) and greater variability in attention at ET (CPT-Var; M=50.05, 60.36; d=0.91; p=.01), and lower CVLT Short Delay Free Recall at RE (M=0.62, -0.15; d=0.81; p=.05).
Conclusions: Results from on-therapy assessment predicted the need for school services 3-7 years after treatment ended. Neurocognitive monitoring is recommended to identify patients at risk for poorer functional outcomes.
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E.E. KENNEDY & A.M. WHITAKER. Long-Term Memory Outcomes in Children with Craniopharyngioma following Transsphenoidal Resection.
Objective: Children with craniopharyngioma are at risk for long-term memory (LTM) deficits following treatment, with endocrinopathies (e.g., hypothalamic involvement) predicting poorer cognitive outcomes. Given lower neurologic/endocrine-related morbidity and less frequent tumor recurrence with transsphenoidal resection (TR) as compared to other approaches (e.g., interhemispheric, transcallosal, pterional), primary aims of this pilot study were: (1) examine LTM in a subset of patients with craniopharyngioma treated with TR and (2) explore differences in LTM between patients treated with TR vs. more invasive surgical approaches.
Participants and Methods: 14 patients with craniopharyngioma (M age=12.7; SD=2.9yrs) underwent neuropsychological evaluation (California Verbal Learning Test) to assess LTM through delayed free recall (FR) and cued recall (CR) trials. Patients treated with TR (n=4) were compared to those treated with non-transsphenoidal approaches (n=10).
Results: There were no significant differences in age at diagnosis or evaluation, radiation dose, income, or ethnicity/primary language/bilingualism between resection groups. The TR group performed in the solidly average to high average range overall (compared to normative data) on delayed trials of FR (M z=.63; SD=.75) and CR (M z=.75; SD=.65), respectively. Patients treated with TR also demonstrated better FR (t=2.37; p=.018) and CR (t=3.26; p=.004) than non-transsphenoidal counterparts.
Conclusions: Despite LTM impairment among children with craniopharyngioma treated with non-transsphenoidal resection, TR is associated with intact LTM. Realizing reduced neuropsychological morbidity in this subset of patients helps predict long-term outcomes; however, baseline differences likely contribute to these findings (as baseline factors inform surgical approach). Additional research is needed to further understand relationships between tumor-related factors/complications, surgical approach, endocrinopathies, and LTM.
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H. LUU, S. PHILLIPS, J. NAFFZIGER & S.A. VAN DYKE. Impact of Cognitive and Emotional Functioning on Quality of Life in Brain Tumor Patients.

Objective: Diagnosis of a brain tumor has been associated with cognitive, behavioral, and emotional changes, all of which impact an individual's quality of life (QoL). The goal of this study was to determine the relationship between QoL and cognitive and emotional factors, including depression and anxiety.

Participants and Methods: Participants were 83 individuals diagnosed with a brain tumor who completed neuropsychological evaluation within an interdisciplinary brain tumor clinic (52.40% male; mean age=50.06, SD=14.05; mean education=14.06, SD=2.46). A hierarchical regression model was constructed predicting quality of life scores on the FACT-BR with TOPF score added to the first step, HVLT delayed recall, Trail Making Test B, and FAS to the second step, and PHQ-9 and GAD-7 added to the last step. An independent sample T-test was utilized to determine participants' objective memory score and its relationship to subjective report.

Results: Results from regression model revealed that variance accounted for in each step was 5, 20, and 63%, respectively. Scores on TMT-B was the only cognitive variable that significantly predicted QoL ($p<0.05$). Self-reported mood symptoms were significant predictors of QoL ($\Delta R^2=0.43$). Results indicated that subjective report of memory concerns is not significantly related to objectively measured verbal memory.

Conclusions: Results revealed that when controlling for cognitive variables, depression and anxiety were significant predictors of QoL. Although approximately 62% of participants expressed memory difficulties, there was no significant relationship between objective performance and subjective report of memory concerns. Overall, these findings suggest that emphasis on mental health services is important for patients with brain tumor. Future research exploring deficits and QoL related to specific pathology and location could be beneficial to guide further treatment planning.

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M.D. MCCURDY, C. BRODSKY, J. BARAN, W. HOBBIE, M.J. FISHER & M.C. HOCKING. Clinician-Generated Metric of Treatment Intensity Predicts Processing Speed in Long-Term Survivors of Childhood Brain Tumors.

Objective: Treatments for childhood brain tumors (BT) place survivors at risk for long-term neuropsychological deficits, though the *intensity* of these treatments remains poorly defined and measured. The current study examined the utility of the Pediatric Neuro-Oncology Rating of Treatment Intensity (PNORTI) in predicting neuropsychological outcomes in survivors of childhood BT.

Participants and Methods: Sixty-five survivors of childhood BT (61.5% male), aged 5-25 years (M=13.61, SD=3.61), completed neuropsychological testing 6.07 years (SD=3.67) following the conclusion of tumor-directed treatment. Age at BT diagnosis ranged from birth to 15.51 years (M=6.96, SD=3.81). Neuropsychological and treatment data were abstracted via retrospective medical record review. Composite scores were generated across age-appropriate measures of global IQ, processing speed, and auditory working memory (DAS; WAIS-IV; WASI-II; WISC-V). Treatment intensity (PNORTI) was classified as Minimal (n=40) or Moderate/Severe (n=25). ANCOVAs examined the association between the PNORTI and neuropsychological performance.

Results: Time since treatment was significantly associated with IQ (r=-.27, p=.04) and processing speed (r=-.30, p=.02). ANCOVA, controlling for time since treatment, revealed significantly higher processing speed in survivors with Minimal (M=91.06, SD=14.22) vs. Moderate/Severe (M=82.27, SD=15.88) PNORTI ratings (p=.03, η_p^2=.08). Treatment intensity groups did not differ with respect to composite IQ (p=.21, η_p^2=.03) or working memory (p=.83, η_p^2<.01).

Conclusions: Survivors of childhood BT are at risk for diminished cognitive processing speed following more intense tumor-directed treatments. Future research should explore the potential relationship between treatment intensity and white matter integrity, particularly as it relates to processing speed outcomes. The PNORTI provides clinicians an easily generated metric of BT-directed treatment intensity, which may aid in assessment and intervention planning in this population.

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S. NA, L. LI, B. CROSSON, V. DOTSON & T. KING. Altered White Matter Topology Underlies Executive Functioning Deficits in Adult Survivors of Pediatric Brain Tumor.

Objective: Adult survivors of pediatric brain tumors exhibit deficits in executive functioning. Given that brain tumors and medical treatments for brain tumors result in disruptions to white matter, graph theory methods were used to investigate white matter network topology and how it relates to executive functioning and neurological risk.

Participants and Methods: This study used diffusion tensor imaging and deterministic tractography in 38 survivors (mean age=23.11(4.96) yrs, 54% female, mean yrs post diagnosis=14.09(6.19)) and 38 matched healthy peers. Nodes were defined using the Automated Anatomical Labeling parcellation. Edges were defined as the mean fractional anisotropy of streamlines connecting node pairs. Executive functioning was measured using the age-normed performance on the Inhibition/Switching trial of the DKEFS Color-Word Interference Test. Cumulative neurological risk was measured using the Neurological Predictor Scale.

Results: Global efficiency ($t(74)$=3.67, p<.01) and average clustering coefficient ($t(74)$=2.82, p<.01) were reduced in survivors compared to healthy peers. There were preferential effects to hub regions, indicating compromise of specific regions that are highly important in healthy brain networks. Lower global efficiency and average clustering coefficient correlated significantly with poorer executive functioning (r=.40, r=.35) and higher levels of neurological and treatment related risk (r=-.61, r=-.65, respectively). Global efficiency mediated differences in executive functioning between survivors and healthy peers, as well as the relationship between cumulative neurological risk and executive functioning in survivors.

Conclusions: Survivors exhibit altered white matter topology in the form of suboptimal integration and segregation of large scale networks. Disrupted topology appear to underlie executive functioning impairments. Network based studies can provide important topographic insights on network organization in long-term survivors of brain tumor.

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E.A. OFFERMANN, K. RUBLE, E. PARÉ-BLAGOEV & L.A. JACOBSON. "Returning to School is Harder than Fighting Cancer?": The Role of Neuropsychology in Supporting School Re-entry.

Objective: Neurocognitive impacts of cancer treatment are well-recognized for survivors of childhood cancer. Parents faced with barriers in knowledge could use the help of neuropsychologist to navigate services following return to school.

Participants and Methods: Data were obtained from a national PCORI-supported survey of parents of childhood cancer survivors.

Results: Parents of 259 survivors (mean age=12.3 years (4.4), 52.6% male; 85.9% Caucasian; disease type: 45.4% ALL, 13.2% brain tumor, 14.6% lymphoma, 19.5% non-CNS cancer) completed the survey; 92% of these children had returned to school.

Less than half (45.5%) of parents felt they knew what types of supports were available to their child and understood their legal rights for special education (42.8%), while just over half felt uncertain if they should push for services or if this was the school's responsibility (53.7%).

Notably, only 35.4% were referred for a neuropsychological evaluation, of whom 81% received an evaluation. Over half of survivors (57%) that

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underwent CNS-directed treatment were never referred for an evaluation even though neuropsychological evaluation is recommended as standard of care for this population. Where obtained, interaction with the neuropsychologist (63.7%) and the report (72.7%) helped parents understand their child's needs better. Neuropsychological reports gave parents specific ideas to help support their child (60.3%), helped parents advocate for their child at school (69.2%), and were easy to understand (58.4%). However, it was less likely that school teams used the report to determine if the child was eligible for additional help (51.5%) or to better understand the child's needs (47.6%).

Conclusions: These data have implications for the role of neuropsychologists in referral processes and supporting this vulnerable population in return to school.

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E.M. PARKE, M.D. RIS, M. TREVIÑO, M. OKCU, K.Y. KAMDAR & K.P. RAGHUBAR. Math achievement and neurocognitive risk factors in survivors of Acute Lymphoblastic Leukemia (ALL).

Objective: Survivors of Acute Lymphoblastic Leukemia (ALL) are at risk for poor outcomes due to late effects of treatment, particularly related to neurocognitive functioning and math achievement. However, not all survivors experience neurocognitive and academic late effects. Given variability in survivors and limited research, the current study sought to characterize math performance and examine math-specific and neurocognitive predictors of math calculation.

Participants and Methods: Participants included 43 survivors of ALL between the ages of 10 and 17 who were off-treatment and disease free for 7 years on average. They were recruited from long-term survivorship clinic and completed a computerized single-digit addition task and standardized measures of math calculation, verbal and visual working memory, and vocabulary.

Results: Survivors performed in the Average range across all measures except digit span forward, which was Low Average. Four survivors (9%) were at risk for a Specific Learning Disability in math calculation (<16th%ile). Bivariate correlations revealed significant relationships between math calculation and demographic variables (i.e., ethnicity), math-specific factors (single-digit addition accuracy), and neurocognitive factors (verbal and visual working memory, vocabulary), but not treatment-related factors (i.e., age at diagnosis, methotrexate dose). Hierarchical regression analysis revealed that verbal working memory emerged as the only significant neurocognitive predictor after accounting for ethnicity and single-digit addition accuracy.

Conclusions: Many survivors of ALL perform similarly to peers on math calculation, though some are at risk for a learning disorder due to secondary neurocognitive late effects. Similar to the general population, foundational math skills and verbal working memory predict math calculation performance in survivors of ALL. Implications for early academic intervention and subject specific accommodations are discussed.

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M. PETERSEN, K. SHELLI, A. HENNEGHAN, J. HALL, M. BRADSHAW, L. JOHNSON & S. O'BRYANT. Relationship between CA125 and cognitive function among a sample of Hispanics.

Objective: Objective: CA125 has been used to predict several types of cancer and has been identified as one of the top 30 serum biomarkers for predicting Alzheimer's disease. To date, no study has evaluated the relationship between CA125 and cognitive function. To address this gap, this study evaluated the link between CA125 and cognitive performance in a cohort of Hispanic individuals due to their known risk for medically-related cognitive impairment. It was hypothesized that higher CA125 levels would be negatively associated with cognitive function.

Participants and Methods: Participants and Methods: Data were analyzed on 468 participants (76% women; mean age 61.37 [SD =8.28]), mean education 7.87 (SD= 4.44) from the Health and Aging Brain among Latino Elders study. CA125 was analyzed using electrochemiluminescence-based multiplex biomarker assay platform. Cognitive function was evaluated using measures of global cognition (MMSE), attention (TMT A), executive functioning (TMTB), verbal fluency (COWA), and memory (WMS-III Logical Memory I, II). The relationship between serum CA125 and cognition was evaluated using multiple linear regression models, with age, gender, and education entered as covariates. Follow-up analyses were split by gender, with age and education as covariates.

Results: Results: As expected, COWA was negatively related to CA125 (β=-0.084; p=0.040). Surprisingly, higher MMSE was related to higher CA125(β=0.315; p=0.013). No other significant findings were seen for other cognitive domains. Gender specific analyses revealed that findings remained significant only in women (COWA, β=-0.149; p=0.001; MMSE, β= 0.145, p= 0.007).

Conclusions: Conclusion: We found both positive and negative relationships between global cognitive function, verbal fluency, and CA125, though these relationships may only apply to women. CA125 may have potential as a diagnostic indicator of cognitive impairment in Hispanic populations, but future research is needed to replicate and expand on these preliminary findings.

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R. PETERSON, U. TABORI, E. BOUFFET & D. MABBOT. Executive Functioning in Long-Term Survivors of Pediatric Low Grade Gliomas.

Objective: Pediatric low-grade gliomas (PLGG) are the most common pediatric neoplasms of the central nervous system. However, little research has examined neuropsychological outcomes in survivors of PLGG treated with resection alone. Our aims were to examine executive functioning, sustained attention, and problem solving abilities in PLGG patients treated without radiation and determine which medical and demographic variables predicted cognitive performance.

Participants and Methods: Twenty-one patients (M_{age}=15.65, SD=2.19) with PLGG (7 infratentorial, 14 supratentorial) were administered subtests from the Working Memory Index (WMI) of the Wechsler Intelligence Scale for Children or Wechsler Adult Intelligence Scale as well as Spatial Span, Intra-Extra Dimensional (IED), and Rapid Visual Processing from the Cambridge Neuropsychological Test Automated Battery.

Results: There were no differences between patients with regards to gender, age at diagnosis assessment, number of surgeries, surgery extent, or history of hydrocephalus (p<.05). Relative to the normative sample, patients had greater difficulty recalling digits and sequencing, and WMI was below norm means (M=81.33, SD=24.84; p<.01). On a visuospatial working memory task, they made more errors and recalled a shorter span of stimuli. Length of span was correlated with surgery extent (r=.632) and omission errors were correlated with number of surgeries and history of hydrocephalus (r=-.436). Sustained attention was poor, with omission and commission errors (p=<.05). Performance on the IED was indicative of poor problem solving, set-shifting, and flexibility (p<.01). There were no performance differences by tumor location.

Conclusions: Results indicate that PLGG patients treated without radiation are at risk for executive dysfunction, and poorly sustained attention and problem solving. Future research that examines brain-based differences between non-radiated PLGG patients and radiated patients.

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K.P. RAGHUBAR, J. OROBIO, M.D. RIS, J. HANNING, J. XUE & L.S. KAHALLEY. Parent-Reported Functional Outcomes in Hispanic and Non-Hispanic Survivors of Pediatric Brain Tumor.

Objective: Although sociodemographic factors such as ethnicity are thought to influence long-term outcomes among cancer survivors, few studies have examined neurocognitive or behavioral outcomes in childhood survivors from ethnic minority groups To date, no studies have compared functional outcomes among Hispanic and non-Hispanic survivors of pediatric brain tumor (PBT).

Participants and Methods: Hispanic (n = 34) and non-Hispanic (n = 34) survivors of PBT over 7 years post-treatment on average, were matched for age at diagnosis (M = 5.88, SD = 3.42), proton versus photon radiation therapy (RT), and craniospinal (CSI) versus focal RT. Parent ratings on the Adaptive Behavior Assessment Scale (ABAS-II/III) and Pediatric Quality of Life Scale (PedsQL) were compared for Hispanic and non-Hispanic survivors as well as for the entire group of PBT survivors to the normative mean.

Results: Hispanic and Non-Hispanic survivors of PBT were rated similarly by parents on global adaptive functioning, including conceptual, practical, and social aspects, and overall health-related quality of life. As a group, Hispanic and non-Hispanic survivors were rated as having significantly worse adaptive skills and health-related quality of life relative to the normative mean (all p-values < .001).

Conclusions: Although previous research has described outcomes among Hispanic survivors of pediatric cancer, this is the first to focus exclusively on PBT survivors and to compare outcomes to a comparable group of Non-Hispanic survivors. Our findings suggest similar levels and patterns of adaptive functioning among Hispanic and non-Hispanic survivors, which are considerably reduced compared to normative peers. Findings are discussed with reference to the complexities of examining outcome disparities among ethnic/racial minority groups, including the practice of employing English measures and norms with Spanish translations in the context of culturally competent assessment.

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A.K. ROTH, M.D. RIS, D.R. GROSSHANS, A. MAHAJAN, M.F. OKCU, M. CHINTAGUMPALA, A.C. PAULINO, J. OROBIO, J. XUE & L.S. KAHALLEY. Adaptive Functioning Outcomes in Survivors of Pediatric Brain Tumors Treated with Proton Radiotherapy.

Objective: Cranial radiotherapy (RT) is associated with cognitive risk. Compared to photon (or X-ray) RT, proton RT (PRT) is hypothesized to spare cognitive abilities by reducing radiation exposure to non-target brain tissue. However, little is known about functional outcomes in survivors of pediatric brain tumors (BT) treated with PRT. The current study examined adaptive functioning in survivors post-PRT.

Participants and Methods: Survivors of pediatric BT treated with PRT completed neurocognitive evaluations including the Adaptive Behavior Assessment System (ABAS-2), Wechsler intelligence scales, and Delis-Kaplan Executive Function System (D-KEFS) subtests. Associations between adaptive functioning and demographic, clinical, and cognitive variables were assessed. Mediation models were tested using a series of linear regressions.

Results: At evaluation, participants were a mean age of 12.84 years and an average of 5.40 years post-PRT delivered either focally (n=33) or to the craniospinal axis (n=37). Global adaptive functioning (M=85.99, SD=21.19) was significantly lower than the normative mean (p<.001). History of craniospinal irradiation (CSI; p=.030), younger age at RT (p=.036), non-White race (p=.008), Full Scale IQ (FSIQ; p<.001), and all D-KEFS subtest scores (p<.001 to p=.031) were associated with worse adaptive outcomes. In model testing, FSIQ was found to fully mediate the association between history of CSI and adaptive functioning, controlling for age at RT and race (p<.001).

Conclusions: As a whole, survivors of pediatric BT treated with PRT exhibited adaptive functioning that was broadly within normal limits; however, CSI, younger age at RT, and non-White race were risk factors for poorer outcomes. The increased risk for adaptive dysfunction experienced by children treated with CSI was fully mediated by the negative impact of CSI on FSIQ in this sample. Findings emphasize the continued importance of efforts to reduce the volume of tissue exposed to RT.

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W.C.M. SCHIMMEL, E. VERHAAK, P.E.J. HANSSENS, K. GEHRING & M.M. SITSKOORN. Cognitive Functioning of Patients with Newly Diagnosed Brain Metastases: A Regression-Based Normative Approach.

Objective: This study evaluates cognitive functioning in patients with newly diagnosed brain metastases (BM) scheduled for Gamma Knife radiosurgery (GKRS) with a neuropsychological test battery, recommended by the International Cognition and Cancer Taskforce (ICCTF). Since Dutch normative data on this battery were not available, data on performance of a Dutch control group was collected to compare patients' test performance to.

Participants and Methods: Cognitive functioning was measured before GKRS with 6 tests (measuring verbal memory, word fluency, working memory, fine motor dexterity, attention, information processing speed, and cognitive flexibility), in patients with 1-10 newly diagnosed BM with expected survival >3 months and KPS ≥70. Multiple linear regression analyses including age, sex and educational level as covariates were performed on the data of the controls to generate normative formulae to calculate Z-scores for 11 test variables. To compare performance of patients with controls, one-sample z-tests were used. Numbers of patients with impairment (Z-scores ≤ -1.5) were counted.

Results: Age, sex and education were well balanced between patients (N=93) and controls (N=104). Patients performed significantly worse than controls on all 11 variables. Effect-sizes ranged from small to very large (Cohen's d= -.28 to -2.45). Frequencies of impairment per test ranged from 8.6% (attention) to 42.7% (fine motor dexterity). Respectively 81% and 61% of patients had impairment in at least 1 and 2 cognitive test variable(s). Fine motor dexterity, information processing speed and cognitive flexibility were most frequently affected.

Conclusions: The majority of patients had objective cognitive impairments in at least two cognitive test variables before treatment of the BM. Interpretation of test performances using a regression-based normative approach may result in personalized interpretation of individual and group cognitive function in clinical and research settings.

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E.L. SHULTZ, A. MILEY, E. LEBLOND, J. KING, S. RAJ, M. NARAD, A. PLATT, A. THOMPSON, K. BAUM, R. SALLOUM & S. WADE. Preliminary efficacy of Survivor's Journey: An online problem solving therapy for survivors of pediatric brain tumors.

Objective: Although pediatric brain tumor (PBT) survivors are at high risk for psychosocial and neurocognitive late effects, few evidence-based interventions exist to address their needs. The aim of the study is to examine improvements in quality of life (QoL) and executive functioning (EF) following an online problem-solving intervention developed for PBT survivors.

Participants and Methods: The intervention, A Survivor's Journey, consisted of 5 core sessions (introduction, problem solving, positive thinking, memory, closing) and up to 6 supplemental sessions (e.g., communication, inattention, fear/worry, stress/self-care). Survivors completed web-modules then teleconferenced weekly with a clinician to implement problem solving around their goals. Survivors (n =19) ages 13- 25 with self or caregiver-reported psychosocial difficulties (SDQ) were enrolled. Survivors and their caregivers completed a brief IQ measure (WASI) and standardized measures of survivor's executive functioning (BRIEF) and quality of life (PedsQL & PROMIS)

pre-and post- intervention. Treatment factors were abstracted from medical charts. Paired sample *t*-tests were used to examine changes pre- to post-intervention, and moderators were examined with linear mixed model analyses.
Results: Completers (n = 18) demonstrated significant improvements in parent-reported emotional QoL and self-reported overall QoL, $t(12)$=-2.44, p=.03, d=.43 and $t(14)$=-3.21, p=.01, d=.58. Greater improvement was noted in adolescent survivors, those who had at least average estimated IQs, who were diagnosed before age 7, and who did not receive radiation. Although there were no significant main effects for EF, moderation analyses revealed significant improvements for adolescents and those with at least average IQs.
Conclusions: Online problem-solving therapy may improve the QoL of PBT, and EF in subgroups of PBT. A randomized controlled trial is necessary to further establish intervention efficacy and who is likely to benefit.
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J. STRATTON, A. SYLVIA, F. HOODIN, S. CHOI, A. PAWARODE, B. GIORDANI & K. VOTRUBA. The Effects of Age on Cognitive Changes Following Hematopoietic Cell Transplantation.
Objective: The majority of patients (51-60%) undergoing hematopoietic cell transplantation (HCT) show cognitive deficits post-HCT, though most scores return to pre-transplant levels by one-year post transplant. Whether age affects the ability of patients to return to their cognitive baseline by one-year post-transplant, however, is not well understood. The current study investigated cognitive changes over the year post-transplant in older adults (age 60+) as compared to younger adults matched for education, gender, and transplant type (i.e., autologous versus allogeneic transplants).
Participants and Methods: Participants were 37 patients undergoing HCT (21 autologous and 16 allogeneic transplant recipients). Mean age and education were 56.0 and 14.7 years, respectively. Patients were grouped based on age: < 60 (n = 20; mean age: 48.9) and ≥ 60 (n = 17; mean age: 64.5). Neuropsychological assessments were conducted before (T1) and 1-year after (T2) transplant and included the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), Trail Making Tests, Grooved Pegboard, Mini Mental State Examination, and the Wisconsin Card Sort Test.
Results: Chi Square tests indicated that the groups did not differ in the percentage of impaired scores across tests at T1 and T2 (i.e., scores ≤ 8th percentile). Independent t-tests indicated that the two groups differed in the amount of change from T1 to T2 on RBANS Story Memory (measuring verbal encoding), with older adults improving and younger adults declining. All other comparisons failed to reach statistical significance.
Conclusions: Findings indicate that older adults show relatively similar cognitive trajectories as their younger counterparts following HCT. Older patients improved on RBANS Story Memory, possibly due to non-significant differences in baseline raw scores. Overall, results suggest that patients age 60 and older who are otherwise neurologically intact may not be at increased risk for worse cognitive outcome, based on age alone.
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T. TARKENTON, M. CLEM, E. LAMPSON, P.L. STAVINOHA & A. HOLLAND. Sex and APOE e4 Effect on Attention and Processing Speed in Pediatric Leukemia Survivors.
Objective: The Apolipoprotein E (*APOE*) e4 allele has been associated with increased risk of cognitive late effects in adult cancer populations. Existing research also has shown female carriers of *APOE* e4 have more cognitive deficits following chemotherapy. This study investigated the interaction of sex and *APOE*genotype with respect to attention and processing speed in a pediatric Acute Lymphoblastic Leukemia (ALL) sample. It was hypothesized female carriers of *APOE*e4 would demonstrate significantly worse processing speed and attention as compared to males.
Participants and Methods: 83 ALL survivors ages 8-19 years at testing (M=13.0; SD=3.2)completed a neuropsychological battery including the Wechsler Processing Speed Index (PSI) and Conners Auditory Continuous Performance Test (CATA). The sample was dichotomized according to sex and presence of any APOE e4 allele. A two-way ANOVA was conducted to investigate the hypothesis.
Results: Groups did not significantly differ on any demographic variables. *APOE*genotype alone was not associated with any differences in measured attention and processing speed. Contrary to the hypothesis, there was a main effect of sex on processing speed (PSI, p=.038) and reaction speed (CATA Hit Reaction Time [HRT], $p_{=}$.009), with females performing better than males. Results revealed an interaction effect between sex and *APOE*e4 only for reaction speed (HRT, F (1,81)=3.8, p=.05), with females performing better than males.
Conclusions: Presence of the *APOE*e4 allele alone does not appear to predict cognitive outcomes of attention and processing speed in pediatric ALL survivors. However, male sex, both alone and in combination with *APOE*e4, may be a risk factor for processing speed and reaction time decline following ALL treatment. Clinically, this finding suggests a potential rationale for targeted monitoring based on allele and sex, pending further confirmatory research. Future studies utilizing control groups and larger sample sizes are indicated.
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P. VAN LONKHUIZEN, S. RIJNEN, S.D. VAN DER LINDEN, G. RUTTEN, K. GEHRING & M.M. SITSKOORN. The Course and Correlates of Subjective Cognitive Functioning in Meningioma Patients Before and After Surgery.
Objective: Patients undergoing surgery for intracranial meningioma perform worse on neuropsychological tests. Still, little is known about subjective cognitive functioning (SCF). The study evaluates the course of SCF from pre- to post-surgery, and its associations with objective cognitive functioning (OCF), anxiety, depression, sociodemographic and clinical characteristics.
Participants and Methods: Assessments were conducted one day before surgery (N = 55), 3 (N = 242) and 12 months post-surgery (N = 51). The number of patients and data available varied between time points, due to expansion of the research project over the years. SCF was measured with the Cognitive Failures Questionnaire (CFQ). Also, the computerized neuropsychological battery CNS VS and the Hospital Anxiety and Depression Scale were administered. To compare patients' mean scores with normative data, one sample *z*-tests were used. Changes in SCF were investigated using paired-sample *t*-tests. Pearson/Spearman correlation coefficients were calculated. The Benjamini-Hochberg procedure was applied to control false discovery rate.
Results: Meningioma patients reported significantly better SCF when compared to normative data both before and 3 months after surgery. At one-year follow-up, no differences were found. A slight non-significant decrease in SCF was observed from 3 to 12 months post-surgery (M_{diff} in *Z*-scores = -0.35). SCF was associated with symptoms of anxiety and depression, but not with OCF, sociodemographic or clinical variables.
Conclusions: Patients did not experience worse SCF, which is not in line with previous findings indicating that patients do experience cognitive deficits, fatigue and lower quality of life. Further research may help to determine suitability of the CFQ in patients with various types of brain tumors. When evaluating cognitive functioning in meningioma patients, measures of both OCF, SCF and psychological distress should be used, to determine whether and which interventions are needed.
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K. VAN DYK, A. ROSENSTEEL, L. DOVEK, C. RAYMOND, A. CHAKHOYAN, B. ELLINGSON & P. NGHIEMPHU. Cognitive function, health-related quality of life (HRQoL), and resting-state functional MRI (rs-fMRI) in long-term survivors of lower grade glioma (LGG): a multiple case study.

Objective: Treatment for LGGs (surgical resection and/or radiation or chemotherapy) can have lasting effects on cognition and HRQoL, but remains poorly understood in this underrepresented patient population. In non-CNS cancer survivorship, cognitive impairment is studied as multifactorial, but similar in-depth studies in LGGs are lacking. Further, resting state networks may be useful biomarkers (Harris 2014), but links to cognition are not well understood. Since data from this population are valuable and scarce, we present preliminary data from the first participants in a study of cognitive function, HRQoL, and neuroimaging in LGG survivors as a multiple case study. RS-fMRI results of two participants with similar tumors/treatment but divergent impairment profiles are also compared.

Participants and Methods: Patients with LGG who completed treatments >6 months prior underwent a standard neuropsychological battery and self-report measures: Beck Depression Inventory-II (mood); Medical Outcomes Study-Short Form (HRQoL), and Functional Assessment of Cancer Therapy–Cognition (complaints). All underwent a multiparametric MRI exam that included rs-fMRI on the same day.

Results: Of the seven participants (mean age 41±10), tumor locations were right frontal (n=2), left frontal (n=2), left temporal (n=2) and right parietal (n=1); 6/7 had radiation and chemotherapy. Cognitive performance was unimpaired and all IQ estimates were >110 in 5/7; 2/7 had consistently impaired scores (-2 SD) in memory, attention, and language, the lowest IQ estimates (90 & 96), and one also reported the worst complaints and HRQoL. Elevated depression in 4/7 appeared unrelated to cognition. Between two participants with left frontal tumors, we observed stronger Default Mode Network (DMN) connectivity in the unimpaired compared to impaired participant.

Conclusions: These preliminary observations in LGG survivors suggest potential links between cognition and DMN connectivity as well as HRQoL and complaints, and that IQ may be a risk/protective factor.

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C. SABA, J. ZHANG, M. BLACKWOOD & T.D. VANNORSDALL. Interventions for Breast Cancer-related Cognitive Fatigue: A Meta-analytic Review.

Objective: Cancer-related fatigue (CRF) is one of the most frequent and functionally limiting symptoms reported during and following breast cancer treatment. Controversy remains as to whether CRF is best conceptualized as a uni- or multi-dimensional construct. Meta-analytic evidence shows that, across cancer types, both exercise and psychological interventions yield small to moderate improvements in general CRF. Pharmacological treatments are less effective. A meta-analysis was conducted to determine whether exercise, psychological, or pharmacological interventions differentially improve the cognitive dimension of CRF in breast cancer.

Participants and Methods: Multiple datasets were searched through 8/31/2017. Eligible studies included randomized controlled trials comparing fatigue interventions to treatment as usual on cognitive and general fatigue outcomes among breast cancer patients and survivors. Random effects models calculated standardized mean differences (SMD) for each intervention type.

Results: Of 397 studies, 7 met inclusion criteria (n = 871 participants). No eligible studies examined pharmacological interventions. Exercise resulted in large to moderate improvements in general (SMD = -1.00, 95% CI -1.80 to -0.26, p = 0.01) and cognitive fatigue (SMD = -0.78, 95% CI -1.44 to -0.13, p = 0.02). Psychological interventions yielded small nonsignificant improvements in cognitive fatigue (SMD = -0.20, 95% CI -0.81 to 0.41, p = 0.53) and were not effective in reducing general fatigue (SMD =-0.11, 95% CI -0.43 to 0.22, p = 0.52). Findings are limited by high heterogeneity (I^2 general CRF = 81.8%, cognitive CFR 75.7%).

Conclusions: Only modest support was found for a multi-dimensional conceptualization of CRF. While exercise demonstrated superior efficacy relative to psychological interventions, exercise was slightly less effective for treating cognitive aspects of fatigue. It remains to be seen whether tailoring treatment strategies to CRF characteristics results in greater treatment response.

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E. VERHAAK, W.C.M. SCHIMMEL, P.E.J. HANSSENS, K. GEHRING & M.M. SITSKOORN. Multidimensional Assessment of Fatigue in Patients with Brain Metastases Before and After Gamma Knife Radiosurgery.

Objective: Little is known about fatigue as multidimensional construct in patients with brain metastases (BM). The aim of this study was to assess the multiple aspects of fatigue in patients with BM as compared to a normative control group before Gamma Knife radiosurgery (GKRS), and up to 6 months thereafter.

Participants and Methods: 93 patients with 1-10 newly diagnosed BM, an expected survival >3 months, and a Karnofsky Performance Status ≥70, scheduled for GKRS, and, 98 Dutch adult controls were recruited. The Multidimensional Fatigue Inventory (MFI), measuring General Fatigue, Physical Fatigue, Reduced Activation, Reduced Motivation and Mental Fatigue, was used to assess symptoms of fatigue before GKRS and 3 and 6 months thereafter. Independent-samples t-tests were used to compare levels of fatigue of patients with BM with levels of fatigue of the control group. A set of linear mixed models (LMMs) of the relationship of each scale of fatigue with time was performed.

Results: Before treatment, patients with BM reported significantly higher levels of fatigue on all subscales compared to the control group (p<.001), with Cohen's d effect sizes ranging between medium and large (.52 to .94). Preliminary results from the LMMs suggest that over 6 months' time, patients with BM reported significantly increased levels of General and Physical Fatigue and decreased levels of Mental Fatigue. Levels of Reduced Activation and Reduced Motivation remained stable over time. Final results will be presented at the conference.

Conclusions: Different patterns were observed for the various aspects of fatigue in patients with BM. Before GKRS, patients experienced more fatigue compared to the control group. General and Physical Fatigue increased even further over 6 months' time while Mental Fatigue decreased. Information on fatigue is important because different aspects of fatigue may have different effects on patients' functional independence, cognitive functioning, quality of life, and adherence to treatment.

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A.M. VON BUTTLAR, E. GREENSPAHN & G. ALLEN. The Role of the Cerebellum in Executive Functioning: A Study of Pediatric Cancers and Brain Tumors.

Objective: The cerebellum's connections with the prefrontal cortex suggest it plays an important role in supporting neurocognitive functioning. Research on the cognitive sequelae of cerebellar brain tumors has historically been limited by a failure to control for the effects of treatments known to affect brain structure and function (e.g., chemotherapy and radiation). The purpose of this study was to examine the impact of pediatric cerebellar brain tumors on executive functioning (EF) while controlling for the neurocognitive effects of treatment.

Participants and Methods: Performance on measures of EF was abstracted from neuropsychological evaluation reports of children and adolescents diagnosed with cerebellar brain tumors (n=32) matched with individuals with non-CNS cancers (n=32) on age at diagnosis and

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time since diagnosis. Hierarchical linear regression examined the relationship between group membership (cerebellar or non-cerebellar) and EF skills in the domains of cognitive flexibility, goal setting, attentional control, and information processing while controlling for treatment-related variables. It was hypothesized that cerebellar group membership would account for a significant amount of variance in performance across EF domains.

Results: Diagnosis significantly predicted performance for goal setting (p=.03) and information processing (p=.02) with lower performance observed in the cerebellar group, especially for males on measures of information processing. Diagnosis did not significantly predict performance on tasks of cognitive flexibility (p=.12) or attentional control (p=.60).

Conclusions: Cerebellar brain tumors contributed significant variance to regression models examining goal setting and information processing after controlling for treatment-related variables, especially for boys on measures of information processing. Possible explanations for the lack of significant findings regarding cognitive flexibility and attentional control are explored and limitations are discussed.

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E.A.H. WARREN, A.E. CHILD, P.T. CIRINO, A.G. VIANA, C.G. MINARD & L.S. KAHALLEY. Cognitive Predictors of Social Adjustment in Pediatric Brain Tumor Survivors: A Comparison of Proton and Photon Radiation Therapy Groups.

Objective: Although pediatric brain tumor survivors are at risk for poor social outcomes and deficits in cognitive function, little is known about cognitive predictors of social adjustment in this population. Further, the degree to which proton beam radiation therapy (PBRT) spares cognitive function and thereby reduces long-term deficits in social functioning relative to conventional radiation therapy (XRT) remains unknown. We hypothesized that cognitive function would mediate the relation of RT group and social adjustment.

Participants and Methods: Pediatric brain tumor survivors (Total N = 83) having undergone PBRT (N = 54) or XRT (N = 29) were evaluated in several cognitive domains (i.e., executive function (EF), attention, processing speed, verbal learning) and social adjustment (i.e., peer relations, social skills). Mediation models were run in MPLUS.

Results: Results suggest a neuroprotective benefit of PBRT over XRT, with the PBRT group outperforming the XRT group on measures of performance-based EF, verbal learning, and processing speed (all $p < 0.01$). However, groups did not differ on rating-based EF, attention, or either social adjustment outcome (all $p > 0.05$). Patients in both RT groups were at risk for peer relation difficulties (M = 63.17, SD = 19.18 XRT; M = 61.17, SD = 23.24 PBRT). Attention significantly predicted social skills (β = -0.179, p = 0.041) and peer relations (β = -0.205, p = 0.047), as did rating-based EF (β = -0.567, $p < 0.001$ social skills; β = 0.578, $p < 0.001$ peer relations). There was no significant mediation effect.

Conclusions: Findings support the need for long-term monitoring of cognitive and social outcomes, with attention and parent-rated EF as indicators of potential social impairment. The present study highlights the importance of careful social adjustment measurement within a theoretical model of social competence. Factors other than cognitive function may prove more influential in predicting long-term social adjustment in this population.

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E.A.H. WARREN, J. OROBIO, A.E. CHILD, M.D. RIS, M.F. OKCU, D.R. GROSSHANS, M. CHINTAGUMPALA, A.C. PAULINO, A. MAHAJAN & L.S. KAHALLEY. Cognitive Correlates and Concordance of Parent- and Patient-Report Ratings of Quality of Life in Pediatric Brain Tumor Survivors Treated with Proton versus Photon Radiotherapy.

Objective: Compared to photon radiotherapy (XRT), proton radiotherapy (PRT) reduces dose to healthy tissue, which may minimize cognitive late effects and improve quality of life (QOL). This study assessed cognitive correlates and concordance between parent and patient QOL ratings in children treated with PRT or XRT.

Participants and Methods: XRT (n=29) and PRT (n=54) survivors were >1 year post-RT at testing. We examined associations among Wechsler IQ scores and parent- and patient-reported scores on the Pediatric Quality of Life Inventory (PedsQL).

Results: XRT and PRT groups did not differ on demographic/clinical variables (68.7% male, M age-at-RT=7.8 yrs, 51.8% infratentorial tumor, 55.0% craniospinal RT), except age-at-evaluation (PRT M=13.2 yrs, XRT M=16.4 yrs; p<0.05) and follow-up interval (PRT M=5.1 yrs, XRT M=8.6 yrs; p<0.01). XRT and PRT group means did not differ across PedsQL scales. Means were worse than norms on all parent- and patient-reported PedsQL scales (all p<0.05). In the XRT group, patient and parent scores were significantly correlated on the Physical Functioning scale only (p<0.01), and patient and parent means differed significantly on the Social Functioning scale (p<0.05). Patients reported better functioning than parents. In the PRT group, significant agreement was identified between parents and patients on all scales (all p<0.05), and no mean differences were identified between raters. With the exception of Emotional Functioning, IQ was associated with all parent-reported PedsQL scales (all p<0.05) but only with patient-reported School Functioning (p<0.01) and Total QOL (p<0.05).

Conclusions: QOL is negatively impacted in pediatric brain tumor survivors regardless of RT modality. While QOL ratings were highly concordant between PRT survivors and parents, XRT raters were broadly discrepant except when assessing physical functioning. Survivor cognitive functioning appears to influence parents' global perceptions of their child's QOL.

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M. WICKENHAUSER, R.B. KHAN, D. RACHES, J. ASHFORD, K. RUSSELL & H.M. CONKLIN. Operationalizing Posterior Fossa Syndrome: A Survey of Experts.

Objective: Approximately 30% of meduolloblastoma patients experience Posterior Fossa Syndrome (PFS) following brain tumor resection, which places them at increased risk for long-term neuropsychological impairment. Lack of consensus regarding diagnostic criteria for PFS significantly impedes clinical care and research. Accordingly, the present study surveyed care providers with expertise in working with children with PFS regarding clinical conceptualization.

Participants and Methods: A brief online survey was developed and sent to 56 professionals including neuro-oncologists, neurosurgeons, and neuropsychologists considered experts in PFS. Participants were asked to answer questions related to their conceptualization of PFS as well as rank order the importance of 10 PFS symptoms drawn from the literature. Thirty-two responses (57%) were received from clinicians with 13.9 average years of experience working with PFS patients from diverse geographical regions.

Results: Results revealed 100% of respondents conceptualize PFS on a severity continuum as opposed to categorical (i.e., present/not present). Further, 66% reported there is a pathognomonic symptom of PFS, with the majority explicitly stating mutism. However, 66% also reported that a period of muteness is not necessary to diagnose PFS. Weighted averages for the rank-ordered symptoms revealed speech/language items (i.e., mutism, limited phrase length, dysarthria, slowed

speech rate/rhythm) were rated most important. Items related to mood/affect (i.e., emotional lability, irritability) followed, and items related to motor impairment (i.e., apraxia, ataxia, dysmetria, hemiparesis) were ranked least important.

Conclusions: The current findings further clarify conceptualization of PFS among experts while also demonstrating lack of diagnostic consensus. Future research is required to establish diagnostic criteria that afford better understanding of etiology and better prediction of lasting neuropsychological impairment.

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S. WITHROW, M. GLODÉ, A. BREGA, S. MIN & J. GRIGSBY. The Effect of Testosterone Suppression on Cognitive Functioning and Emotional Wellbeing Among Prostate Cancer Patients.

Objective: Associations between reductions in testosterone (T), impairments in specific areas of cognition, and emotional distress among prostate cancer patients undergoing Androgen Deprivation Therapy (ADT) have been found. This study examined the effects of long-term suppression on various domains of cognitive functioning and emotional wellbeing.

Participants and Methods: In this study, 73 prostate cancer patients between the ages of 50 and 81 years underwent continuous or intermittent ADT. Neuropsychological assessments were conducted after 24 to 36 months and T levels were converted into biologically available T levels (BioT). Hypotheses were tested using hierarchical multiple regression and Pearson correlations.

Results: Differences in BioT levels accounted for 30.3% of variation seen in verbal similarities abstraction abilities (WAIS-IV similarities subtest; $F(3,57) = 9.36$ $p < 0.001$) after adjusting for age and education. Furthermore, 7.8% of the variation in verbal fluency scores (COWAT; $F(3,57) = 4.18$ $p < 0.01$) was accounted for by BioT levels after adjusting for the same covariates. Neither Similarities score nor COWAT score was significantly associated with either Quality of Life (QOL) or depression. No effect of BioT on verbal learning and memory, spatial perception, and speed of information processing was found. However, the experience of depressive symptoms, fatigue, and reduced physical health was consistently correlated with lower performance (all $p < 0.05$) on measures of verbal auditory learning (word list and brief story). Lower levels of BioT were associated with self-report of poorer physical health and fatigue. (all $p < 0.05$), but not with any measures of emotional wellbeing.

Conclusions: Lower levels of BioT among prostate cancer patients receiving ADT were associated with poorer performance on measures of verbal reasoning and executive functioning. The experience of emotional distress and reduced QOL is significantly related to cognitive test performance, although the direction of influence is not known.

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J. ZEAL, E. KALSCHEUR, J. KOOP & A. HEFFELFINGER. Impact of Family Factors on Adaptive Functioning of Pediatric Brain Tumor Survivors.

Objective: Further research is needed to understand the variance in adaptive functioning amongst pediatric brain tumor (PBT) survivors. We hypothesize that lower parenting stress, less parental overprotection, and lower parental perceived child vulnerability is associated with higher child adaptive functioning.

Participants and Methods: The parents of 16 children (aged M=12.0 years, SD=4.4) completed a measure of their child's adaptive functioning (Adaptive Behavioral Assessment System) along with inventories on their own parenting stress level (Parental Stress Inventory-Short Form), perception of their child's vulnerability (Child Vulnerability Scale), and their parenting behaviors (Parental Protection Scale) within 13 years of PBT diagnosis. Correlations between parental perceptions, behaviors, and adaptive domains were examined.

Results: Preliminary data analysis suggests lower reported parental stress attributed to the parent-child relationship and attributed to the child are moderately correlated with higher child conceptual ($r = -.693$, $p = .003$; $r = -.576$, $p = .020$) and social skills ($r = -.504$, $p = .047$; $r = -.482$, $p = .059$), but they are poorly correlated with practical skills ($r = -.196$, $p = .466$; $r = .036$, $p = .895$). Trends suggest that less parental overprotection is moderately associated with increased overall adaptive functioning ($r = -.654$, $p = .023$). Perceived child vulnerability appeared unrelated to overall adaptive functioning ($r = .086$, $p = .752$).

Conclusions: Preliminary work demonstrates lower parenting-related stress is related to stronger conceptual and social adaptive functioning in PBT survivors. Consistent with the notion that children need ample opportunities to master new skills, decreased overprotection was related to higher overall adaptive functioning. Further supporting that protection behaviors are distinct from thoughts of child susceptibility, perceived child vulnerability was unrelated to adaptive outcomes. The final sample analysis will provide greater power to explore these relationships.

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Epilepsy/Seizures

K. BALL, K.E. HASSARA, C.B. SADURNI, P. PEREZ DELGADILLO & D.A. PEARSON. Pre and Post Surgical Neuropsychological Profile of Corpus Callosotomy Patient: A Case Study.

Objective: Epilepsy in children has been linked to multiple etiologies (e.g., genetic syndromes, TBI, CNS infection, stroke). Neuropsychological deficits associated with pediatric epilepsy vary greatly. Although antiepileptic drugs (AEDs) remain a prime treatment for epilepsy; for 20-30% of children with refractory epilepsy, brain surgery has become a safe and suitable option. There are few studies regarding neuropsychological outcomes of anterior corpus callosotomy patients with concurrent vagal nerve stimulation (VNS). Pre and post-surgical neuropsychological functioning of a 6-year-old male with partial corpus callosotomy and vagal nerve stimulator (VNS) is presented.

Participants and Methods: Patient's medical history includes treatment refractory seizures (including atypical absence, tonic and atonic head drop episodes) that began at 3 years old. Patient underwent a partial corpus callosotomy (right craniotomy for the anterior two-thirds corpus callosotomy), and subsequent VNS placement. Pre and post-surgical neuropsychological testing at ages 5 and 6 included SB-5, WIAT-III, NEPSY-2, WRAML-2, PLS-5, Beery VMI-6 and behavioral/emotional measures.

Results: Test results revealed significant declines in overall cognitive function with ongoing seizure activity and after surgery. Relative weaknesses were noted in verbal functioning, working memory, memory, learning, fine motor coordination, visual perception, visual motor integration, executive functioning, and attention. Interestingly, processing speed was noted to improve following surgery.

Conclusions: Extensive cognitive and motor declines were noted over time in this child with a history of refractory seizure activity and partial corpus callosotomy. Further research may help clarify the relative contributions of seizure activity and surgical sequellae on functional status in children with epilepsy who undergo partial corpus callosotomy.

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L. BOLDEN, J. GRIFFIS, R. NENERT, J. ALLENDORFER & J. SZAFLARSKI. Attention Performance is Influenced by Cortical Excitability and Seizure Control in Patients with Idiopathic Generalized Epilepsies (IGEs).

Objective: We previously demonstrated that higher cortical excitability (i.e. hyperexcitability) in healthy controls is associated with poorer attentional ability. Interestingly, patients with idiopathic generalized epilepsies (IGEs) are known to demonstrate increased cortical excitability (i.e. hyperexcitability) as well as cognitive deficits in frontal lobe cognitive domains. The aim of this study was to investigate the effects of cortical excitability and seizure control on cognitive performance in IGEs.

Participants and Methods: Single-pulse and paired-pulse TMS was applied to 30 patients with IGEs (16 controlled (cIGEs) and 14 treatment-resistant (trIGEs)) and 24 healthy controls (HCs) to measure cortical excitability, including long-interval intracortical inhibition (LICI). A neuropsychological battery was administered to assess aspects of attention (Digit Span Forwards; Digit Span Backwards; Trails A; Flanker) and executive function (Trails B; Stroop Color and Word Test; WCST).

Results: Two between-subjects MANOVAs revealed that participants with primarily excitatory LICI responses, indicating higher cortical excitability, performed significantly worse than participants with primarily inhibitory responses on the composite measure of attention ($p = 0.011$), but not executive function ($p = 0.606$). In addition, participants with trIGEs performed worse on the Digit Forwards (FDR$p<0.001$), Digit Backwards (FDR$p=0.015$), and Flanker (FDR$p=0.0075$) tasks compared to HCs.

Conclusions: As in healthy subjects, cortical hyperexcitability is associated with poorer attentional ability in IGE. Future studies may consider targeting intracortical $GABA_B$ networks to explore that nature of this relationship further. Findings also indicate that attention is affected by seizure control, as patients with trIGEs, but not cIGEs, performanced worse on attention measures than healthy controls.

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L. BOLDEN, J. GRIFFIS, R. NENERT, J. ALLENDORFER & J. SZAFLARSKI. Cortical Excitability Influences Mood State in Patients with Idiopathic Generalized Epilepsies (IGEs).

Objective: We previously demonstrated in healthy adults that higher cortical excitability (i.e. hyperexcitability) is associated with more negative mood states. While patients with idiopathic generalized epilepsies (IGEs) are shown to exhibit hyperexcitability and a high prevalence of mood comorbidities, a relationship between these variables in IGEs has not been investigated. Thus, we aimed to investigate the influences of cortical excitability and seizure control on mood state in patients with IGEs.

Participants and Methods: 30 patients with IGEs (16 controlled - cIGEs, 14 with treatment resistance - trIGEs) and 22 healthy controls were examined in this study. Cortical excitability, including long-interval intracortical inhibition (LICI), was measured using TMS. The Profile of Mood Sates (POMS) self-report questionnaire was used to assess total mood disturbance (TMD), as well as, six mood domains: Depression, Confusion, Anger, Anxiety, Fatigue, and Vigor.

Results: A two-way MANOVA revealed a significant main effect of LICI response on TMD ($F(1, 46) = 4.69$, $p=0.04$), but not seizure control ($F(2, 46) = 0.288$, $p=0.75$). Participants with primarily excitatory LICI responses, indicating higher cortical excitability, endorsed significantly higher TMD scores (i.e. greater mood disturbance) than inhibitory responders ($MD = -2.12$; $T(50) = -2.47$, $p=0.04$). Excitatory responders also endorsed more items than inhibitory responders on the Depression ($MD = -2.12$; $T(50) = -2.47$, $p=0.04$) and Fatigue ($MD = -3.42$; $T(50) = -2.96$, $p=0.03$) subscales.

Conclusions: We provide additional evidence for the relationship between hyperexcitability and mood disturbance and demonstrate that cortical excitability, but not seizure control, affects mood state in patients with IGEs. Findings also provide support for the role of intracortical $GABA_B$ circuitry in depression.

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D. CARNS, J.L. GESS, J.S. KLEINER, A. KEMP & L. LARSON-PRIOR. Utilization of DKEFS Fluency Measures to Determine Laterality in Epilepsy Patients.

Objective: The present study was conducted to determine efficacy of verbal and design fluency measures from the Delis-Kaplan Executive Functioning System (DKEFS) in determining seizure laterality in epilepsy patients.

Participants and Methods: Seventy-eight subjects diagnosed with epilepsy with epileptogenic focus either localized in the left, right, or bilateral hemispheres of temporal, frontotemporal, or frontal regions were included. Fifty percent of these subjects were diagnosed with temporal lobe epilepsy (TLE). Patients underwent a full-battery of neuropsychological tests as part of a pre-surgical evaluation. Of the 78 subjects a total of 66 completed DKEFS design fluency and 70 completed DKEFS verbal fluency measures. Statistical analyses included Pearson correlations and linear regressions.

Results: Multiple linear regressions and bivariate correlations failed to show significant differences between right- and left- sided groups after controlling for education and sex. Age and handedness were not controlled for as they were not significantly related to outcome measures. Among fluency variables, the three design fluency conditions were significantly correlated with phonemic, semantic, and semantic switching trials of verbal fluency.

Conclusions: While results indicate significant correlations among fluency variables there is no significant relationship between performances on the verbal and non-verbal generative fluency measures and epileptogenic lateralization. Overall, the results suggest that these measures have limited utility in the determination of seizure laterality in pre-surgical evaluations. Finally, it is important to note that relationships approaching significance that did not reach it were likely impacted by the small sample size.

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D. CARNS, J.S. KLEINER, J.L. GESS, A. KEMP & L. LARSON-PRIOR. Relationship of Seizure Locality and Error Rates on the Wisconsin Card Sorting Test.

Objective: The present study was conducted to determine the relationship between seizure locality and laterality with the types of errors made on the Wisconsin Card Sorting Test (WCST).

Participants and Methods: Participants included seventy-eight subjects diagnosed with epilepsy with epileptogenic focus localized in right, left, or bilateral hemispheres of temporal, frontotemporal, and frontal regions. Localization was unable to be defined in 27 subjects. The remaining subjects included 39 with seizure focus in the temporal region, 10 localized in the frontotemporal region, and 2 in the frontal region. Patients underwent a full-battery of neuropsychological tests as part of a pre-surgical evaluation. Of the 78 subjects a total of 57 were able to complete the WCST. Statistical analysis included Pearson correlations and analysis of variance with a post-hoc LSD analysis.

Results: Bivariate correlations failed to show significant correlations among right- and left- sided groups, but did show differences for seizure localization. ANOVA failed to show significant differences among WCST total errors and perseverative errors. However, significant differences were found for WCST non-perseverative errors. Non-perseverative errors were found to predict localization in frontal regions, but not in individuals with frontotemporal, temporal, or unlocalized seizures. Age, handedness, education, and sex were not controlled for as they were not significantly related to outcome measures.

Conclusions: This study has shown that non-perseverative errors on the WCST are related to frontal lobe seizure localization. While the overall results suggest limited utility of the WCST total errors and perseverative errors in determining the focus of seizures, it does indicate that interpretation of non-perseverative error scores may be beneficial for localization. This suggests the WCST should be considered for pre-surgical testing batteries.

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B. DOLAN, J. KOOP & M. LOMAN. Characterizing Language Performance in Pediatric Patients with Intractable Epilepsy Pre- and Post-Surgical Resection.

Objective: For pediatric patients with medically refractory epilepsy presenting for surgery, neuropsychology assesses and predicts risk for cognitive decline post-surgery. For patients with a dominant, presumably left, hemisphere epileptic focus and planned resection, families, neurologists, and neurosurgeons are particularly concerned about language. This study aims to describe language functioning in pediatric epilepsy patients following left hemisphere resection.

Participants and Methods: Retrospective chart review and descriptive statistics were utilized to describe pediatric patients' (N = 17) lateralized hemisphere dysfunction (LRI) and confrontation naming abilities (Boston Naming Test; BNT) following left hemisphere surgery. Calculation of the LRI is clinically derived and based on pre-surgical performance discrepancies between verbal and visual domains, as well as fine motor dexterity. Raw scores were utilized given the inherent limitations of the BNT normative data for a pediatric sample. Change scores were computed for the BNT.

Results: There was only one patient whose post-resection score remained relatively unchanged; this patient had high average range performances and a nonlateralizing presurgical profile. Two patients demonstrated significant developmental gains, as initial mildly impaired scores improved to average following surgery; one patient was rated as having weak dominant dysfunction and the other was identified with moderate nondominant dysfunction. Nine patients (53%) with mildly to severely impaired pre-surgical scores did not show improvement post-surgery; this included a mix of dominant dysfunction, nondominant dysfunction, and nonlateralizing profiles.

Conclusions: Consistent with the literature, patients whose scores on a naming measure that were already impaired are likely to remain that way, whereas others, after reduced seizure burden, may actually experience improvement. Neuropsychology's role in understanding and predicting risk remains relevant.

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P. DUONG, S. RODGIN, C. RODWELLER, B.S. SLOMINE & C. SALORIO. The Impact of Inpatient Rehabilitation on Functional Outcomes in Children Following Hemispherectomy Surgery.

Objective: Acute inpatient rehabilitation (IR) is often recommended following hemispherectomy (HE) surgery, yet no studies have examined its efficacy. This study examined change in functional independence as well as cognitive and motor skills among children admitted to IR after HE.

Participants and Methods: Thirty children (M=7 years; 14 males) admitted to IR following HE between 2003-2017 were evaluated with the Functional Independence Measure for Children (WeeFIM) at admission and discharge, as well as 3-months and 1-year post-discharge. At admission and discharge, children were also administered the Cognitive and Linguistic Scale (CALS) and the Physical Ability and Mobility Scale (PAMS), more comprehensive measures of cognitive and motor skills, respectively. Paired t-tests and Repeated measures ANOVA examined change over time in CALS, PAMS, and WeeFIM Developmental Quotient (DQ) total and domain (self-care, mobility, cognitive) scores. Functional gains were also examined in relation to side of surgery and etiology, classified as developmental (cortical malformation or early vascular event, n=20) or acquired (Rassmussen Encephalitis, n=10).

Results: Onset of seizures to surgery was M=3.8 years (SD=3.5). Time from surgery to rehabilitation admission was M=13 days (SD=5). Average length of IR stay was 23.7 days (range 2-89 days). Significant gains were seen from admission to discharge across all WeeFIM scores (all p's<.001), CALS (p<.001) and PAMS (p<.001). As a group, significant gains were seen on all WeeFIM scores across the four time points (all p's<.001). In addition, an interaction between WeeFIM scores and etiology was seen, such that the acquired group made greater gains over time (p<.05). Side of surgery was not significantly related to change over time.

Conclusions: Results suggest that acute IR following HE is associated with significant improvement across functional outcomes both during IR and continuing after discharge. Etiology is an important predictor of rate of change in functioning.

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B.D. ESCHLER, J. MIETCHEN, S. HILL & S.D. GALE. Confirmatory Factor Analysis and Invariance of the Rey Auditory Verbal Learning Test in Individuals with Psychogenic Nonepileptic and Epileptic Seizures.

Objective: Confirm the factor structure of the Rey Auditory Verbal Learning Test (RAVLT) in a sample of individuals with either psychogenic nonepileptic seizures (PNES) or epileptic seizures (ES) and determine if RAVLT is invariant for these two groups.

Participants and Methods: Participants were 419 individuals diagnosed via VEEG on an inpatient epilepsy monitoring unit (PNES = 199). Groups differed significantly on age of seizure onset and duration of seizures but were not different on age at testing, education, or sex. A multiple groups moderation model using structural equation modeling was conducted to determine measurement equivalence between the two groups.

Results: The freely estimated model indicated that the factor structure previously identified was a good fit for the data (RMSEA = 0.123, CFI = 0.951, TLI = 0.914, SRMR = 0.049). Factor loadings (recognition, false positives, short-delay free recall, and long-delay free recall) were then constrained to be equivalent across groups as they loaded onto the latent variable, "Recall." Lagrange multiplier tests indicated that the factor loadings were not equivalent for recognition (p = 0.008), short-delay recall (p = 0.032), and false positives (p = 0.005). The two groups differed on mean recognition hits (M_{ES} = 13.03, M_{PNES} = 12.89, p = 0.018) and false positives (M_{ES} = 3.25 M_{PNES} = 2.31, p = 0.026). The covariance between the total free recall score and the latent variable Recall was not equivalent (c^2 = 5.36, p = 0.021).

Conclusions: These results indicate that the RAVLT does not have measurement equivalence for individuals with PNES and ES. Differences existed for the manner in which recognition hits, short-delay recall, and false-positive loaded onto the latent variable Recall. The ES group performed better on recognition hits but also endorsed more false positives than the PNES group. Thus, individuals with PNES have different patterns of performance on the RAVLT than do individuals with ES.

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S. FATOORECHI & G. LEE. Atypical Language Representation as a Protective Factor Against Verbal Memory Decline Following Epilepsy Surgery.

Objective: An important role of neuropsychology in the preoperative evaluation of epilepsy surgery candidates is to evaluate the risk for postoperative cognitive decline. One factor associated with postoperative verbal memory decline is surgery in the language dominant hemisphere.

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The aim of the study was to determine whether atypical language representation has a protective effect against verbal memory decline following left temporal and frontal lobectomies.
Participants and Methods: Data from 59 individuals with medically refractory epilepsy, valid ICA Wada testing, and valid pre- and post-surgical neuropsychological evaluations from Barrow Neurological Institute, Yale University, Medical College of Georgia, and Washington University was gathered and examined for pre- to post-surgical neuropsychological changes. Wada testing was examined to determine language dominance (left, bilateral, or right).
Results: Significant postoperative verbal memory decline was observed in the left language group while the atypical language group showed verbal memory improvement ($F_{1, 56}$=11.81, p< 0.01). Individuals with left language were more likely to show postoperative declines in verbal memory while individuals with atypical language were significantly less likely to decline (X^2 =13.51, df=2, p<0.01). As expected, no significant differences were seen between the left and atypical language groups and no differences were noted between individuals with left and atypical language with regard to postoperative visuospatial memory outcome.
Conclusions: Individuals with atypical language dominance had better verbal memory outcomes following left hemisphere resections than those with left language dominance suggesting that typical memory substrates have reorganized such that the contralateral right hemisphere helps subserve verbal memory processes. These findings will help improve neuropsychological prediction of postsurgical memory outcomes in epilepsy surgery patients.
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M. FISCHER, M. FIUMEDORA, B. MOSELEY & P. SHEAR. The Impact of AED Polypharmacy on Cognitive Function in Refractory Temporal Lobe Epilepsy.
Objective: Patients with refractory epilepsy are often prescribed multiple antiepileptic drugs (AEDs), which is associated with increased cognitive dysfunction (Mula & Trimble, 2009). AED-related cognitive effects increase with the numbers of medications and disproportionately affect executive functioning, with lesser effects on declarative memory (Witt, et al. 2015). The present study sought to replicate the finding of selective AED-associated executive dysfunction and to extend the literature by 1) focusing on patients with medically refractory TLE, who are at high risk of declarative memory dysfunction and 2) applying a classification system that categorizes medications by their cognitive risk profiles.
Participants and Methods: Participants were 71 patients with medically refractory, video-EEG confirmed TLE (41 left; 27 right; 3 bilateral; mean age 41.9+12.3; education 13.4+2.7 years). AED regimens were classified into 3 medication risk (MRC) tiers based on their risk of causing cognitive dysfunction, using a modified version of the system described by Samarasekera, et. al 2015. Neuropsychological measures were drawn from a comprehensive clinical battery.
Results: Greater MRC was significantly correlated (p<.05 for all comparisons) with lower FSIQ and poorer working memory (WM). In contrast, MRC was not significantly associated with measures of verbal or visual memory, psychomotor speed, confrontation naming, set switching, or fine motor speed or coordination. Similar results were obtained when patients were classified by the number of AEDs they were prescribed rather than medication risk.
Conclusions: Number of AEDs and MRC were significant predictors of IQ and WM. However, even in a medically refractory sample, medications did not significantly impact performance in other cognitive domains. These data suggest that standard dosing of multiple AEDs is unlikely to contribute meaningfully to declarative memory deficits in those with temporal lobe epilepsy.
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C.T. FULLEN, J. MARCEAUX & J. KIRTON. Improving Documentation of Behavioral Health Issues in an Oupatient Epilepsy Clinic.
Objective: The rate of psychiatric and cognitive complaints is higher in patients with seizure disorders than the general population (e.g., Holmes, 2015; Jones et al., 2003). VA Epilepsy Centers of Excellence (ECOE) Mental Health Workgroup identified inadequate documentation of suicide risk and behavioral health symptoms in ECOE patients. This quality improvement (QI) study sought to evaluate whether implementing a screening instrument would improve assessment and documentation of behavioral health symptoms in an outpatient clinic.
Participants and Methods: A medical record review was conducted for 73 VA ECOE patients. The behavioral health screener was a self-report measure comprised of validated measures of depression (NDDI-E) and anxiety (GAD7) and items assessing sleep, substance use, suicidal ideation, and cognitive problems. The control group (n=36) included patients seen prior to implementation of the screener. The QI group (n=37) included those administered the screener during ECOE visit. Descriptive statistics and chi square analyses were used to evaluate documentation and referral practices based on information contained in the corresponding neurology notes. Providers were not privy to the information being gathered from notes a priori.
Results: Use of the behavioral health screener significantly improved documentation of subjective patient reports for substance use (χ^2=4.1, p=.042), suicidal ideation (χ^2=8.7, p=.003), and cognitive complaints (χ^2=4.0, p=.046). Percent documentation shifted from 31% to 54%, 0% to 22%, and 5% to 22%, respectively. Documentation of mood and referral to mental health was not improved.
Conclusions: Implementation of a behavioral health screener improved documentation of behavioral health symptoms in an outpatient epilepsy clinic. Despite this improvement, documentation was less than 50% in most cases and there remains room for improvement. Findings are promising and will inform changes in practice in this setting.
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J.M. GRABYAN, D.A. PROTO, E. KELLOGG, R. COLLINS & D.K. CHEN. Patients with Psychogenic Non-Epileptic Seizures do not Evidence Impaired Cognition When Controlling for Performance Validity.
Objective: The utility of neuropsychological assessment in identifying patterns of cognitive performance in those with epileptic seizures (ES) and psychogenic non-epileptic seizures (PNES), and assisting in diagnostic differentiation, has been an area of ambiguity. The varying use of performance validity tests (PVTs) in the literature may underlie this uncertainty. This study seeks to add clarity to this topic by examining scores on PVTs and neuropsychological measures (across multiple cognitive domains) in a sample of adult patients diagnosed with either ES or PNES.
Participants and Methods: Consecutive patients referred to an epilepsy monitoring unit for evaluation of intractable seizures, who were subsequently diagnosed with ES (32) or PNES (75), were studied. A fixed battery of neuropsychological measures and PVTs were administered prior to disclosure of diagnosis. Patients were then classified by both their diagnostic status and pass/fail of PVTs (i.e., PNESpass, PNESfail, & ESpass – the ESfail group was too small to statistically analyze).
Results: PVT failure was more likely in PNES (45%) than ES (25%) patients. There were no differences between PNES and ES on neuropsychological tests when ignoring PVT results. However, when PVTs were considered, the PNESfail group scored significantly worse than PNESpass and ESpass groups across all cognitive domains.
Conclusions: Performance validity testing is a critical component of neuropsychological assessment of individuals with PNES: Those who fail PVTs also present with significantly worse cognitive symptoms (a finding not observed when examining PNES without accounting for PVT status), despite lacking a clear neurological basis for doing so.

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Indeed, if patients putting forth invalid performance are not controlled for, clinicians put themselves at risk for coming to faulty conclusions while more parsimonious explanations are available.
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C.L. HAAK, A. KAIRYS, D. KELLY & S. MUSIL. Utility of MMPI-2 Critical Items in Differentiating Patients with Epileptic and Non-Epileptic Seizures.

Objective: Non-epileptic seizures (NES) are paroxysms that can resemble epileptic seizures (ES) but lack aberrant epileptiform activity. The gold standard for diagnosing NES is the use of continuous video-electroencephalogram (cvEEG). Psychological assessment plays a role in identifying risk factors for NES and the Minnesota Multiphasic Personality Inventory (MMPI-2) can be helpful in identifying the tendency to develop symptoms in response to stress. However, no MMPI-2 profile is unique to one patient group or the other. The purpose of this study was to examine whether MMPI-2 critical items could be useful in helping to differentiate patients with ES and NES.
Participants and Methods: 133 patients (103 ES, 30 NES), diagnoses confirmed by cvEEG, completed the first 370 items of the MMPI-2 as part of a diagnostic evaluation. A bootstrapped logistic regression was run to determine the predictive ability of individual critical items from 3 Lachar-Wrobel categories: Somatic Symptoms, Anxiety and Tension, and Depression and Worry.
Results: There were no significant group differences in age, education, gender, or ethnicity.
The overall logistic regression model was significant ($\chi^2(44, N = 133) = 82.635, p < .01$) and correctly identified 94.7% of cases. Positive predictive value was 96%, while negative predictive value was 94.4%. In the bootstrapped analysis of variable significance, only two items (75 and 150) were not significant at the $p < .01$ level. Removing those items reduced the identification ability of the model to 91.7%, which suggests that the overall pattern of critical item endorsement must be considered.
Conclusions: Differences in endorsement of critical items from the Somatic Symptoms, Anxiety and Tension, and Depression and Worry categories on the MMPI-2 were able to differentiate cvEEG confirmed cases of ES and NES. Including these items in analyzing MMPI-2 findings may increase the diagnostic utility of the MMPI-2 in patients with NES.
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H.J. LOBLEIN, N. NUSSBAUM & J. TITUS. The Role of Stigma, Anxiety, and Seizure Severity on Quality of Life in Pediatric Epilepsy.

Objective: Health related quality of life (HRQoL) is an individual's perceptions of quality of life relative to their health or disease status. Internalizing psychiatric comorbidities have the most significant impact on quality of life compared to other demographic and epilepsy variables. Individuals with epilepsy are at an increased risk of feeling stigmatized and discriminated against because of their epilepsy, which is also related to poorer quality of life.
Participants and Methods: The present study included 121 patients (52 male) with epilepsy (age 6-18 years). Epilepsy variables were collected via medical chart review. Anxiety was assessed with the BASC-2 or BASC-3. Parent perception of stigma was assessed with the Epilepsy Stigma Scale and health-related quality of life was assessed with the QOLCE. A series of simultaneous multiple regression analyses were conducted to predict total and domain specific HRQoL based on IQ, seizure severity, anxiety, parent perceptions of stigma, and parent illness cognitions.
Results: The regression model for total HRQoL was statistically significant, $F(5, 115) = 20.170$, $p < .001$, and accounted for 46.7% of the variance in parent reported quality of life. Stigma, parent illness cognitions, and parent reported child anxiety all uniquely contributed to HRQoL, even when accounting for IQ and seizure severity. Additionally, the examined variables affected quality of life differentially across the HRQoL domains.
Conclusions: Seizure severity was only a significant predictor of HRQoL in the physical and social domains, which aligns with other research in pediatric epilepsy and research of post-surgical outcomes. This suggests that while improving seizure outcomes is important, other psychosocial factors, such as anxiety, cognitive functioning, parent illness cognitions, and parent perceptions of stigma, need to be addressed in order to improve quality of life in youth with epilepsy.
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S.A. MANDELBAUM, K. COULEHAN, J. YOUNG, M.A. CORNWELL, M. FIELDS, L. MARCUSE, S. GHATAN, F. PANOV, J. YOO & H.A. BENDER. Clinical Utility of Individual Neuropsychological Measures in Predicting Seizure Onset Zones In Epilepsy Patients Undergoing SEEG Monitoring.

Objective: Neuropsychological (NP) assessment for presurgical epilepsy patients aids in determining seizure onset zone (SOZ). Extant literature suggests that cognitive measures of language, motor, and memory are indicative of SOZ lateralization. The current pilot study examined the ability of these cognitive measures to predict lateralization of SOZ as identified with stereoelectroencephalography (SEEG).
Participants and Methods: This study included 11 patients with intractable epilepsy consecutively referred for outpatient comprehensive NP pre-operative assessment. Inclusion criteria involved clinical need for SEEG monitoring to determine SOZ; implantations were 2 right-sided, 2 left sided, and 7 bilateral. Patients ranged in age from 23-57 years and were 27% male. Grooved Pegboard (GPB), Rey-Osterrieth Complex Figure (RCFT), Rey Auditory Verbal Learning Test (RAVLT), and Boston Naming Test (BNT) from NINDS Common Data Elements Battery were selected to predict SOZ lateralization.
Results: All patients with SEEG identified bilateral SOZ presented with bilaterally impaired performance on GPB. In contrast, 83% of patients with unilateral SOZ showed intact GPB ability. Regarding memory, 66% of patients with right hemisphere SOZ performed worse on RCFT than RAVLT delayed recall. Only 50% of patients with left hemisphere SOZ demonstrated poorer RAVLT delayed recall relative to RCFT recall. Performance on BNT did not consistently predict SOZ lateralization.
Conclusions: Bilaterally impaired fine motor dexterity was suggestive of bilateral SOZ, but unilateral fine motor weakness was not consistently predictive of unilateral SOZ. Visual memory performance strongly predicted right hemisphere SOZ. Naming and verbal memory did not consistently predict SOZ lateralization. NP performance on cognitive measures suggestive of SOZ lateralization was highly variable. As such, NP data should be considered in their entirety to best predict lateralization of SOZ as determined by SEEG.
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K. MCKITTRICK, D.P. WABER, M. TAKEOKA & K. BOYER. Psychosocial Functioning and Interictal Epileptiform Discharges in Children with Benign Rolandic Epilepsy.

Objective: To assess psychosocial adjustment in children with Benign Rolandic Epilepsy (BRE) and explore potential relationships with interictal epileptiform discharges (IEDs).
Participants and Methods: Thirty-nine children (ages 6-11; 65% male) with BRE or BRE trait were recruited from clinical databases based on seizure semiology and EEG findings. Participants completed neuropsychological assessments that included parent and self-report questionnaires: Behavior Assessment System for Children, 2nd Edition (BASC-2)

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parent form, and Children's Depression Inventory, 2nd Edition (CDI-2), parent and self reports. Routine sleep-deprived EEGs were analyzed to quantify IEDs, including laterality and frequency per minute. Frequency of elevated T-scores (>65) was assessed for the psychosocial variables and Pearson correlations were calculated between the psychosocial and IED variables (right, left, and bilateral IEDs/minute).

Results: Ten percent of participants parents reported elevations in Internalizing Problems (mean=47.8, SD=9.7), and 7% reported elevations in Externalizing Problems (mean=49.3, SD=10.7). Hyperactivity (18%), atypicality (13%), attention problems (15%), social skills (13%), and leadership (13%) were most frequently elevated. The frequencies of elevated parent- and self-report CDI-2 total-depression scores were 2.5% (mean=47.7, SD=9.1) and 0% (mean=43.2, SD=5.8) respectively. There was a moderate correlation, however, between left-hemispheric IED frequency per minute and self-reported CDI total depression scores ($r = .365$, $p = .04$).

Conclusions: The frequency of clinically relevant psychosocial difficulties was low in this sample, suggesting generally positive psychosocial adjustment. However, there was a moderate association between left-hemispheric IEDs and self-reported symptoms of depression. Although this finding was uncorrected for multiple comparisons, it is consistent with a previous finding in a different sample (Sarco et al., 2011), suggesting that it may not be random and merits further consideration.

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G. MILLS. Prospective Memory in Children with Epilepsy.

Objective: Prospective memory (PM), the ability to remember to perform an intended act in the future, is a complex process that involves several stages and cognitive domains. Children with epilepsy have been shown to have cognitive deficits in domains important to the PM process. The purpose of this study was to assess prospective memory in school-aged children with idiopathic epilepsy.

Participants and Methods: Participants were comprised of two groups of children between the ages of 7 and 12; 19 children with idiopathic epilepsy and 26 healthy children. Performance on a brief test of intelligence, the Memory for Intentions Screening Test for Youth (MISTY), and the prospective memory portions of the Rivermead Behavioral Memory Test for Children (RBMT-C) was compared between groups. Additionally, within and between group performances on several MISTY PM task characteristics (i.e., cue-type, time-delay, and response-type) were also analyzed.

Results: While no significant differences in performance between groups were found on the MISTY, significant differences were found on RBMT-C items. No significant interaction effect was found between the participant group and the type of cue, length of time delay, and type of response for the MISTY items, though significant differences were found in the cue type and length of delay across participants, with all participants performing better on event- when compared to time-based tasks and bettern on two- when compared to ten-minute tasks.

Conclusions: The study unearthed some evidence of poorer PM functioning in children with epilepsy, specifically on more cognitively demanding tasks, when compared to healthy non-clinical children. Differences between groups were not found across all PM tasks used in the study, however, thus highlighting potential methodological problems with the use of wide-ranging PM tasks across research and clinical settings and emphasizing the need for continued efforts to develop effective and psychometrically valid clinical assessments of PM.

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M. MOHANTY, R. REKHAPALLI, S. GUPTA, N. SINGLA, P. KHARBANDA, B. RADOTRA & C. AHUJA. Impact of Surgery on Cognitive Functioning in Patients with Drug Resistant Unilateral Mesial Temporal Lobe Epilepsy.

Objective: The present study was designed to evaluate the impact of surgery on cognitive functioning in patients with drug resistant unilateral mesial temporal lobe epilepsy.

Participants and Methods: The study was approved by Institute Ethics Committee. Thirty-four patients above 18 years with mesial temporal lobe epilepsy were enrolled after seeking informed consent. Patients with MRI negative drug resistant epilepsy, past history of psychiatric illness, head injury, mental retardation and other neurological illness were excluded. All patients underwent detailed neurological evaluation, visual assessment, Video EEG and Structural MRI imaging. A detailed cognitive assessment was carried out before and after surgery using tests validated for Indian population.

Results: There were 18 males and 16 females with a mean age of 28 + 7.04 years. A significant change was observed only in phonemic fluency (Baseline mean 5.64 + 2.03 vs. postoperative mean 6.24 + 1.79). However, the side of surgery was found to have significant association with cognitive outcome. A significant increase in performance IQ, mean IQ, associative learning and phonemic fluency was observed in right mesial temporal lobe sclerosis patients. But there was no significant difference between the scores obtained at pre and post-surgery in left mesial temporal lobe sclerosis patients. Verbal memory decline was seen in 29.4% of left MTLS patients and 11.8% of right mesial temporal lobe sclerosis (MTLS) patients. Visual memory decline was seen in 5.9% of left MTLS patients and 17.6% of right MTLS patients. Postoperative decline in verbal IQ, performance IQ, phonemic fluency and categorical fluency was seen in 3.1% - 11.8% of patients.

Conclusions: Resective epilepsy surgery for hippocampal sclerosis is safe and effective in terms of seizure freedom and cognitive outcome. The results of our centre with non-invasive presurgical evaluation protocol were comparable to the international standard.

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L. NAKHUTINA, S.A. MARGOLIS, L. KENNEY, S. CALDERON, J. GONZALEZ & A. GRANT. Comparison of the GAD-7 and BAI in a Diverse Sample of Adults with Intractable Epilepsy.

Objective: Anxiety disorders are prevalent in people with epilepsy (PWE); however, validation of common screening inventories is limited, particularly among underserved groups. This study did a head-to-head comparison of the Generalized Anxiety Disorder-7 item scale (GAD-7) and the Beck Anxiety Inventory (BAI) in racially/ethnically diverse adults with intractable seizures.

Participants and Methods: Participants (N=60; age=41.75±13.48; 62% women; Black=78.4%, Hispanic=20%, White=8.3%, Other=8.3%, Mixed Race=5%) had ≥2 seizures in the prior 6 months. Anxiety Disorders were diagnosed via the Mini-International Neuropsychiatric Interview (MINI). Concurrent validity of the GAD-7 and BAI was examined with Pearson correlation. Receiver operating characteristic (ROC) curves assessed GAD-7 and BAI's accuracy in predicting current MINI-diagnosed Anxiety Disorders and set cut-offs maximizing sensitivity and specificity.

Results: Overall, 43% qualified for ≥1 Anxiety Disorder; diagnoses included Agoraphobia (26.7%), Social Phobia (10%), GAD (8.3%), OCD (8.3%), PTSD (5%), and Panic Disorder (3%). On average, participants endorsed mild anxiety based on traditional cut-offs (GAD-7: 5.68±5.31; BAI: 11.65±8.89). GAD-7 and BAI shared 44% of their variance ($r=0.66$, $p<0.001$). ROC curves revealed equitable distribution ability for GAD-7 (AUC=0.71, p=0.007) and BAI (AUC=0.73, p=0.003). Youden's Index showed that a GAD-7 cut-off=3 had sensitivity=81%, specificity=65%, PPV=64%, and NPV=82%. At a cut-off of 10, BAI had sensitivity=69%, specificity=68%, PPV=62%, and NPV=74%.

Conclusions: Both anxiety inventories demonstrated fair specificity. GAD-7 had better sensitivity than the BAI; however, ROC analysis produced a very low cut-off for GAD-7. This suggests that PWE endorsing even very mild symptoms are at increased risk of having an anxiety disorder. The practical utility of these screeners may vary depending on the prevalence of anxiety in a given clinical setting. Further research is needed to understand anxiety in the context of epilepsy.

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R. NG & E.K. HODGES. Beyond Seizure Factors: Cognitive Proficiency and Attention Functioning Correlates of Academic Skills Among Children with Epilepsy.

Objective: Learning disabilities and academic difficulties are prevalent among those with a history of childhood epilepsy (CE). Deficits in working memory (WM), processing speed (PS), attention functioning, and executive functioning (EF) have also been implicated in CE, which may be related to elevated risk of academic underachievement. The goal of this study was to examine the associations between subcortical and frontal neuropsychological functions, including attention, WM, PS, and EF with academic skills, when controlling for intellectual functioning, as measured by general ability index (GAI), and seizure factors among youth with CE.

Participants and Methods: Data was collected from 47 child patients who were diagnosed with generalized/partial epilepsy, confirmed with EEG in a pediatric neurology clinic. Seizure information (age of onset, months seizure-free, AEDs) were obtained by a clinical interview with caregivers and confirmed with medical records. Patients were administered a neurocognitive test battery, which included: WISC-IV/V, WAIS-IV, Trailmaking A and B Tests, DKEFS Trailmaking Test, Children's Category Test, and measures from WJ-IV and WIAT-III. Caregivers completed the Child Behavior Checklist to assess for overall attention problems.

Results: After controlling for seizure factors and GAI, WM and PS were a significant determinants of performance on measures of math calculation skills (WM: b=0.39, p=0.03; PS: b=0.45, p=0.02) and spelling (WM: b=0.45, p=0.006; PS: b=0.39, p=0.02). An indirect, moderate association between parent-reported attention problems with word reading was found (b=0.28, p=0.09). EF (cognitive flexibility, problem-solving) was not a significant determinant of academic measures.

Conclusions: WM, PS, and attention functioning are areas that warrant more screening and considerations for intervention and educational planning to mitigate risks of academic underachievement associated with CE.

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R. ABDULLAH, R. NG & E.K. HODGES. History of Neonatal Jaundice and Respiratory Distress Among Children with Epilepsy: Effects on Subcortical and Frontal Functions.

Objective: The goal of this study was to examine whether children with a history of neonatal jaundice (NJ) and respiratory distress (RD) and diagnosis of epilepsy yield incrementally greater deficits in executive functioning (EF), working memory (WM), attention, and processing speed (PS) relative to those without neonatal complications, given that repeated seizures may reduce neuroplasticity in this population

Participants and Methods: Data was collected from 76 pediatric outpatients (Without NJ: N=61, 28F, M_{age} = 10.87 years; With NJ: N=15, 4F, M_{age} = 12.12 years; Without RD: N=59, 28F, M_{age} = 11.13 years; With RD: N=17, 4F, M_{age} = 11.06 years) who were diagnosed with epilepsy. History of neonatal complications and seizures was acquired through medical record review and an interview with caregivers. Standardized measures of intellectual functioning, processing speed, working memory, executive functioning, and parent ratings were administered.

Results: Controlling for intellectual functioning and seizure factors (age at testing, number of AEDs prescribed, age of seizure onset, duration without seizures), no group differences in EF, WM, attention, and PS were observed among children with epilepsy by group. In regards to PS, seizure factor (number of AEDs prescribed) was a significant covariate - with a greater number of anticonvulsants associated with reduced PS (p=0.002). Amount of time without a seizure was a marginally significant covariate for degree of parent-reported inattention problems (p=0.07). Neonatal complications and seizure factors did not yield significant effects on EF measures when intellectual functioning was controlled.

Conclusions: Children with epilepsy and a history of NJ or RD do not yield more deficits in EF, WM, attention, and PS than those without the neonatal complications. However, prompt engagement in cognitive interventions and considerations for day-to-day accommodations across settings may be critical for children with significant early seizures and extensive AED treatment.

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J. NOSKER, T.L. BRAGG, S. ZARKOU & C. SANDERS. The Neurochemical Relationship Between Epilepsy and Depression: Pediatric Assessment and Research Implications.

Objective: The systematic review seeks to elucidate the neurochemical bidirectional relationship between depression and epilepsy in pediatric populations. Assessment and research implications are discussed.

Participants and Methods: Pubmed and Pubmed Central were selected to identify empirical studies. Search terms included epilepsy, depression, bidirectional relationship, psychiatric comorbidities, screening, stress sensitivity, and monoamine pathways. Twenty-one peer-reviewed articles published in English from 2008-2018 were chosen for review.

Results: Common proposed mechanisms of both disorders include: abnormal activity and receptor sensitivity of several neurotransmitters including glutamate, gamma aminobutyric acid (GABA), and serotonin. Abnormal functioning of the hypothalamic pituitary adrenal (HPA) axis was also identified as common to both epilepsy and depression (Kanner, 2009). Due to the symptomatic expression in pediatric epileptic patients, depression is frequently underdiagnosed. Three screening tools are endorsed for routine epileptic and primary care to aid diagnosis, pharmacological and nonpharmacological treatment.

Conclusions: The development of epilepsy and depression may be attributed to various risk factors (e.g., biology, chronicity of seizures, psychosocial factors, and polytherapy). Yet, emerging research suggests epilepsy and depression may develop concurrently or independently due to similar pathogenic events or processes (Kanner, Mazarati, & Koepp, 2014). Future research can focus on the relationship between the lobe of onset and behavioral phenotypes of depression, as these data are not typically obtained in population-based studies.

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R. MITCHELL, A. REALE-CALDWELL, R. RUM & M.R. SCHOENBERG. Comparing the Test of Premorbid Functioning (TOPF) and the North American Adult Reading Test (NAART) to estimate premorbid Wechsler Adult Intelligence Scale – 4th Edition FSIQ in a clinical sample with epilepsy.

Objective: This study evaluated the clinical utility of the Test of Premorbid Functioning (TOPF) and the North American Adult Reading Test (NAART) as premorbid estimates of Full Scale Intelligence Quotient (FSIQ), building upon previous research with a larger sample.

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Participants and Methods: Participants included 105 pre-operative temporal lobe epilepsy (TLE) patients who were administered the TOPF, NAART, and WAIS-IV. Mean age of participants was 40.10 (12.89) with an average of 13.71 (2.15) years of education. The mean WAIS-IV FSIQ for this sample was 88.92 (14.20). The sample was comprised of 55.8% males, and 75.9% Caucasian participants. Paired-sample *t*-tests were utilized to assess potential differences between the TOPF and NAART, as well as each of these to WAIS-IV FSIQ.
Results: Both TOPF (M = 98.65, SD = 9.80) and NAART (M =102.63, SD = 8.87) premorbid estimates differed from the healthy population theoretical mean (FSIQ = 100), with significant differences found for both TOPF ($t(105)$=-9.192, $p < .001$) and NAART ($t(93)$=-10.898, $p < .001$).
Conclusions: Current data extends previous research by including a larger sample size. Current data suggests the NAART has clinical utility for predicting premorbid FSIQ scores among patients with neuropsychological deficits, with the TOPF appearing to underestimate premorbid IQ. Future research should further increase sample size and include additional participants with more demographically and ethnically diverse populations to corroborate current findings.
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A. REYES, V. CERVANTES, K. HOOPER, B. PAUL & C.R. MCDONALD. Differential impact of cerebrovascular risk factors on processing speed and executive function in patients with temporal lobe epilepsy.
Objective: Cerebrovascular risk factors (CVRFs) have been shown to be associated with accelerated cognitive aging. Despite evidence that even young to middle-aged patients with temporal lobe epilepsy (TLE) are at increased risk for elevated CVRFs that may result in reduced brain health and early cognitive decline, surprisingly few studies have examined the effects of CVRFs on cognition in TLE. We explored the effects of CVRFs on processing speed (PS) and executive function (EF) in young to middle-aged patients with TLE.
Participants and Methods: One-hundred and seven patients 18-65 years of age with TLE underwent neuropsychological evaluation and clinical exams. TMT-Part A was used as a measure of PS, whereas DKEFS Color-Word Switching (CWS) and TMT-B were used as measures of EF. CVRFs included pulse pressure proxy (PPP= systolic minus diastolic blood pressure) and body max index (BMI) as vascular status and glucose as metabolic status. Patients were divided into groups based on BMI classification. Hierarchical regression was used to evaluate the unique contributions of glucose and PPP to cognitive scores, controlling for age, sex, age of seizure onset, number of antiepileptic drugs, and seizure frequency.
Results: Forty-six patients had a BMI in the healthy range (43%), 31 were overweight (29%), and 30 were obese (28%). The groups did not differ in any demographic or epilepsy clinical variable. In the overweight group, higher BMI was associated with poorer CWS performance (r = -0.536, p =.022; R^2 change = .315, p =.019); higher PPP was associated with poorer TMT-A performance (r = -.552, p =.006; R^2 change= .234, p =.015). There were no significant associations between BMI, glucose or PPP and any cognitive score in the healthy-weight or obese group.
Conclusions: Elevated CVRFs may have a negative impact on PS and EF in overweight patients with TLE beyond the contributions of age and disease-specific variables, which could confer a greater risk for accelerated aging in this patient cohort.
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S. RODGIN, P. DUONG, J. SALPEKAR & C. SALORIO. Predictors of Processing Speed Weaknesses in Children with Epilepsy.
Objective: Processing speed is consistently weaker in children with epilepsy compared to healthy controls. While studies have shown that depression, anxiety, and attention-deficit/hyperactivity disorder (ADHD) symptoms contribute to processing speed, these predictors have yet to be examined in children with epilepsy. The current study aims to assess contributors to processing speed in a pediatric epilepsy sample.
Participants and Methods: The study included 203 children with primary epilepsy (mean age = 9.9; 52% males). Predictors of the Wechsler Intelligence Scale for Children Processing Speed Index (PSI) included seizure related variables (number of anti-epileptic drugs (AEDs), age of onset, duration of epilepsy, seizure frequency, and seizure type), mood and ADHD symptoms (Behavior Assessment Systems for Children; BASC-2), and executive functioning (Brief Rating Inventory of Executive Function; BRIEF). Preliminary analyses were conducted using independent sample t-tests, ANOVAs, and Pearson correlations. Significant predictors were entered into hierarchical regression models.
Results: Higher number of AEDs (p<.01) and higher current seizure frequency (p=.03) were associated with lower PSI. BASC-2 Depression and Anxiety were not significantly associated with PSI. Controlling for seizure variables, Attention Problems (r=-.35, p<0.01), Hyperactivity (r=-.26, p<0.01), and the BRIEF Global Executive Composite (r=-.38, p<0.01) were all significantly associated with PSI. With all predictors entered in the model, number of AEDs was the only significant predictor of PSI (b=-.25, p=.01).
Conclusions: Findings suggest that number of AEDs and seizure frequency, as well as ADHD symptoms and executive functioning, have an impact on processing speed and should be considered in interpreting PSI scores for children with epilepsy. Non-significant associations between mood and PSI may be due to a low number of elevated Anxiety and Depression scores in this sample.
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L. SEGALA, E. WIGGS, W. THEODORE, N. NDIAYE, K. ZAGHLOUL, J. HEISS, S. SATO & S. INATI. The Lateralizing Value of Neuropsychological Tests in Temporal Lobe Epilepsy.
Objective: The aim of the study was to investigate the lateralizing value of several neuropsychological tests in a sample of temporal lobe epilepsy (TLE) patients. Although deficit patterns in neuropsychological evaluations can suggest focus or site of dysfunction, the lateralizing value of neuropsychological instruments has not been consistently supported in seizure patients without expansive lesions.
Participants and Methods: Participants included 48 right-handed TLE patients (left, n=27; right, n=21) that subsequently underwent surgery for drug-resistant focal epilepsy. Side of surgical resection was used to operationally define seizure lateralization. Patients with expansive lesions were eliminated from the sample. All patients underwent a neuropsychological evaluation prior to surgery. The lateralizing value of several subtests from that battery was investigated, including the Boston Naming Test (BNT), phonemic fluency (FAS), and a variety of Wechsler Memory Scale-Third Edition (WMS-III) and Wechsler Adult Intelligence Scale-Third Edition (WAIS-III) subtests.
Results: Right and left TLE groups were similar in terms of group demographics, except for age of seizure onset, which was earlier in left TLE patients. Independent logistic regression analyses revealed that both the BNT and the Vocabulary subtest (WAIS-III) significantly predicted side of seizure focus. When both predictors were considered in combination, only Vocabulary was a significant predictor of seizure laterality.
Conclusions: In the current study, language tests were the best predictors of seizure focus lateralization. Neuropsychological tests appear to be more sensitive to dominant hemisphere dysfunction, suggesting that non-verbal abilities have less anatomical specificity. The predictive lateralizing value of neuropsychological instruments is generally modest;

however, neuropsychological assessment remains a valuable resource to establish baseline functioning and diagnosis of cognitive deficits.
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M. FIUMEDORA, M. FISCHER, C. SPEELMAN, P. SHEAR, Q.R. MANO & M. SOLOMON. Visuospatial Contribution to the Learning of Semantically-Related Versus -Unrelated Word Pairs in Temporal Lobe Epilepsy.

Objective: Paired associate learning is dependent on mesial temporal lobe (MTL) integrity. Existing reports suggest that the left MTL is involved in encoding semantically-unrelated but not -related word pairs. Previous research, including analyses of the present sample, shows that verbal paired associate (VPA) learning involves additional recruitment of contralateral and extratemporal brain areas related to visuospatial functioning. The current study extends our prior work by exploring whether visuospatial functioning differentially influences learning of semantically-related versus -unrelated word pairs in a population with known MTL dysfunction.
Participants and Methods: Participants were 82 patients with video-EEG confirmed temporal lobe epilepsy (TLE) who completed the WMS-IV VPA Learning, Benton Judgment of Line Orientation (JLO), and WAIS-IV Block Design. VPAL protocols were rescored to generate separate indices for semantically-related and -unrelated word pairs.
Results: JLO and Block Design were both significantly and positively correlated with learning of semantically-unrelated pairs (p = .003 for both comparisons), while correlations between the visuospatial measures and semantically-related pairs did not reach statistical significance (*p>.1 for both comparisons*). However, Fisher r-to-z transformations indicated that correlations for the unrelated pairs and related pairs were comparable in magnitude (p > .05 for all comparisons).
Conclusions: Visuospatial skill is significantly related to better learning of semantically-unrelated but not semantically-related word pairs in those with TLE, although the magnitude of these correlations does not differ significantly. We hypothesize that learning of verbal pairs pulls for the use of visuospatial strategies such as mental imagery. Because both the semantically-related and -unrelated WMS word pairs include concrete, image-evoking words, both types of pairs allow for visuospatial mediation, which may in part explain their similar relationships with visuospatial ability.
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L. TENGOWSKI, S.L. SALINAS, J.S. KLEINER, J.L. GESS, A. KEMP & L. LARSON-PRIOR. A Task of Visual Integration Can Help Lateralize Seizure Location in Pre-Surgical Epilepsy Candidates.

Objective: Pre-surgical epilepsy candidates undergo a neuropsychological evaluation to help predict postsurgical cognitive outcomes and to assist in lateralizing the onset of the seizures. The goal of this study was to determine if performance on visuospatial tasks is more sensitive to patients with right-sided epilepsy through the use of the Rey-Osterrieth Complex Figure (ROCF), Judgement of Line Orientation (JLO), and WAIS-IV Block Design (BD).
Participants and Methods: The sample included 66 patients (37 male, 29 female) ages 18-66 who had been diagnosed with epilepsy and were undergoing a neuropsychological evaluation as part of their pre-surgical workup. Thirty-eight subjects had left-sided epilepsy and 28 had right-sided epilepsy. An independent t-test was performed to compare the scores from the ROCF, JLO, and BD based on the lateralization of the epilepsy.
Results: Statistical analysis revealed a significant difference between patients with left and right-sided seizure foci on the BD test, with right-sided seizure focus related to poorer performance on this task. The other tests showed that right-sided epilepsy patients had lower scores than those with left-sided epilepsy, but they were not statistically significant.
Conclusions: The results of the study revealed that patients with right-sided epilepsy foci performed worse than those with left-sided epilepsy foci on these measures; however, the only test that showed a statistically significant difference between seizure foci was the BD test. Therefore, the BD test appears to be more sensitive to patients with epilepsy focused in the right hemisphere and may help predict seizure lateralization.
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J. PERKINS, S.S. WILKINS, B. MESRAOUA & G. ALARCÓN PALOMO. Depression Negatively Influences Performance on Cognitive Screening in Epilepsy.

Objective: Depression negatively influences cognitive functioning whilst also being the leading psychiatric comorbidity in epilepsy. This study investigates how depression influences cognitive screening and identifies epilepsy-related or psychosocial factors that predict poor cognitive performance. The study also explores which aspects of depression influence cognitive ability.
Participants and Methods: 91 patients were recruited from the Epilepsy Monitoring Unit at Hamad General Hospital, Doha. Cognitive functioning was assessed using the Montreal Cognitive Assessment (MoCA) and the PHQ-9 for depression. Epilepsy-related and psychosocial factors included; age, sex, education, marital and residential status (RESS), anti epileptic drugs (AED), seizure onset, seizure severity (SS), temporal lobe involvement, seizure within 24 hours and number of drugs (NOD). *t* tests, one way ANOVA, univariate analysis, binary logistic regression and Barnard's Exact Tests were used to explore means and predictors related to depression and MoCA scores.
Results: A significant difference was found for years of education and MoCA scores (p=0.047). Six variables were included in the multivariable regression; depression, SS, NOD, age, sex and RESS. After adjustment, depression remained an independent predictor of low MoCA outcomes (p=0.038). Barnard's Exact Test showed that concentration was the primary aspect of depression that caused suboptimal MoCA performance (p=0.02).
Conclusions: Baseline screening in epilepsy will optimally include both mood and cognitive assessment. Cognitive results should be interpreted in light of the patient's depression scores, particularly noting the impact of reduced concentration in patients with moderate or higher levels of depression. Ideally cognition will be assessed/re-assessed once mood has been optimized.
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A. MARSH, H. ELBERT, C. DOODY, H. THORBURN & I. WRIGHT. The Mirror Memory Task: Clinical Suitability for Predicting Post-Operative Cognitive Outcome in Epilepsy Surgery.

Objective: Resection of the epileptogenic zone is the most effective treatment for refractory temporal lobe epilepsy. Predicting post-operative memory deficit is integral to inform risk-benefit decision making for surgery. In order to predict this, procedures are required to quantify and lateralise memory function. The development of visuospatial protocols to do this has proved more challenging than verbal protocols, with left hemisphere processing biases and verbalisation strategies restricting the development of a task with visuospatial specificty. This paper aimed to determine the merit of the Mirror Memory Task in quantifying visuospatial memory function and in selectively activating visuospatial neural substrates under fMRI to lateralise function.
Participants and Methods: 66 healthy controls and 20 patients with epilepsy underwent a forced-choice visuospatial recognition task that tested memory for orientation of a novel stimulus. fMRI data was also collected for 15 healthy controls and 20 patients. Behavioural data was analysed to determine encoding efficacy and used to support analysis of

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fMRI data. Behavioural data was compared to gold standard memory tests. ROI analysis was employed to lateralise visual memory function. **Results:** Convergent validity of the task against gold standards is reported. Behavioural results show modest levels of recognition accuracy for visual scenes, therefore adequate opportunity for analysis of hits versus misses in an event related analysis. ROI analysis demonstrated recruitment of right hippocampus during successful encoding of visuospatial scenes in healthy controls. Selected patient data is presented to illustrate the utility of this paradigm in predicting post-operative memory outcome.
Conclusions: This paradigm demonstrates promise as a suitable tool in predicting post-operative memory decline in epilepsy surgery.
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Genetics/Genetic Disorders

P. ALBERT & D. MARCUS. Executive Functioning of Children and Adolescents with an Additional X Chromosome.
Objective: It is well documented that inheritance of an additional X chromosome can have deleterious effects on cognitive functioning (Bender et al., 1991; Boada et al., 2009; Hong & Reiss, 2014). Research suggests that executive functioning (EF) is particularly impaired in these individuals (Lee et al., 2011, 2015; Van Rijn et al., 2009). Lee et al. (2015) found that in contrast to other trisomy syndromes (i.e., Down Syndrome), individuals with an additional X chromosome had more problems with "hot" ("affectively-heavy") than "cool" ("cognitively-related") EF. The purpose of the current study is: 1) to examine if a similar profile of EF problems is found in our sample of boys with Klinefelter Syndrome (47,XXY) and girls with Trisomy X (47,XXX), and 2) to compare parent ratings of EF across two scales (BRIEF/BRIEF-2 and BASC-2/BASC-3). Specifically, we investigate if EF ratings are similar across these scales, and what extra information is provided by BASC EF and Emotional Control content scales, less commonly used ratings of EF.
Participants and Methods: This study included 23 children and adolescents with Klinefelter Syndrome (N=16) or Trisomy X (N=7). Participants were evaluated at a pediatric medical center as part of routine clinical care.
Results: Analyses revealed significant, moderate to large correlations between BASC content scales and all BRIEF scales. The BRIEF ratings indicated slightly greater difficulties with emotional control and shifting than with inhibitory control. Ratings of organization of materials were stronger than other cognitive regulation skills. No significant differences were found between the index scores or subscales within the indices, due in part to the small sample size.
Conclusions: Results support previous findings of a relatively flat EF profile in individuals with Klinefelter Syndrome and Trisomy X, with some relative strengths and weaknesses. The strong correspondence across different parent ratings highlights the need for further investigation of EF profiles in this population.
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M.C. BLACKWELL, V. CULOTTA & R. FLEISCHER. Neuropsychological Profile Associated with 12p13.33 Deletion.
Objective: De novo deletion of 12p13.33 is a rare genetic disorder associated with a wide range of neurodevelopmental manifestations including speech delay, behavioral and social difficulties, and intellectual disability. There are few reports in the literature regarding this anomaly. The purpose of this case study is to facilitate awareness of 12p13.33 deletion and contribute to an expanding data base of rare genetic disorders.
Participants and Methods: This single-subject design included a 10-year-old male born at term with mild respiratory distress and syndactyly. Genetic testing revealed a partial de novo deletion of 12p13.33. The participant was seen for neuropsychological assessment at a community-based clinic. Interview and record review revealed a history of learning and attention differences, articulation difficulties, and features of an Autism spectrum Disorder. He was described as avoidant regarding the development and maintenance of peer relationships.
Results: Test results were consistent with a diagnosis of an Autism Spectrum Disorder with Language and Intellectual Impairments, ADHD, Specific Learning Disabilities, Dysgraphia, and Speech Sound Disorder. Relative strengths were evident in aspects of verbal cognition including receptive vocabulary, semantic reasoning, and semantic learning. Spelling strength suggested intact phonemic/grapheme awareness. Neuropsychological deficits were evident in multiple domains including cognitive abilities, verbal memory, verbal fluency, visual-motor skills, and executive functioning.
Conclusions: This case study examined a 10-year-old male with a rare 12p13.33 deletion. He presented with a wide range of neurodevelopmental deficits, more severe than those suggested by the limited literature. Assessment and diagnostic characterization of his profile contributes to an expanding data base regarding this specific deletion and the role of genetic testing in early identification and intervention of children with similar profiles.
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A. BRYANT, K. EVERSOLE, L. BOXLEY & C. BLOCK. Neurocognitive Impairment Secondary to Cerebrotendinous Xanthomatosis.
Objective: Cerebrotendinous xanthomatosis (CTX) is a rare autosomal recessive disease characterized by faulty biosynthesis of cholesterol into bile acids which results in excessive cholestenol throughout the body. Disease presentation is variable as abnormal deposition of cholesterol/cholestenol can occur in multiple tissues, including the brain. Mr. Z is 39-year-old Caucasian male who was referred by Neurology following a CTX diagnosis confirmed by abnormal cholestenol levels and subsequent genetic testing showing mutation of CYP27 gene. This case demonstrates the deleterious neurocognitive outcomes of untreated CTX.
Participants and Methods: A single-case series design. In 2017, Mr. Z presented for comprehensive neuropsychological evaluation to establish current level of functioning. His care team included Neurology, Neuropsychiatry, Social Work, and Occupational Therapy. Treatment recommendations for Mr. Z and his family were the culmination of interdisciplinary approach.
Results: Mr. Z denied any concerns related to physical, emotional/behavioral, or cognitive functioning while his spouse endorsed numerous neuropsychiatric/cognitive symptoms. During the assessment, he demonstrated mild dysmetria and mild dysdiadochokinesia with disturbed spatial judgment. Mr. Z demonstrated severe impairment in global cognition, visuospatial function, attention/executive functioning, visuomotor speed/dexterity, learning/memory, and expressive language. Breadth and depth of impairment were consistent with Major Neurocognitive Disorder.
Conclusions: Previous studies of cognitive functioning in CTX are limited. While the prevalence of CTX is low, untreated CTX can result in irreversible dementia; treatment with medications can slow this process. Neuropsychology plays an important role within interdisciplinary teams for differential diagnosis as genetic diseases can present as otherwise classic cases of highly prevalent diseases such as early-onset dementia. In this case, neuropsychological findings helped provide recommendations for Mr. Z.
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J.A. CHIANG, V. SHUMAKOVA, K.J. GREENFIELD & M. PATTERSON. Proposed Phenotype for Females with SETD5 Gene Variation: A Case Study.

Objective: SET domain containing 5 (SETD5) gene variants have been linked to developmental delays, craniofacial abnormalities, and intellectual disability (ID). Prior research examining the phenotypic presentation of individuals with a SETD5 variation has been based largely on male-dominated cohort and case studies. Evidence of a possible protective effect in females prompts the need for additional research on the neuropsychological presentation of females with a SETD5 variation. The current study aims to initiate this effort by discussing the neurocognitive profile of a right-handed 7-year-old Caucasian female with a diagnosed SETD5 variation.

Participants and Methods: The patient was referred for a neuropsychological assessment due to reported reading, writing, and fine motor difficulties. She was subsequently referred for genetic testing, which revealed a de novo SETD5 frameshift variant resulting in a truncation of the gene copy near the end of the gene.

Results: The patient presented with distinct dysmorphic features: head circumference <1st %ile, syndactyly of toes, clinodactyly of fifth fingers, and a long smooth philtrum with a thin upper lip. Interpersonally, she was highly social. Cognitive testing revealed low average intelligence, with significant inter-index discrepancies; while language functioning was average, nonverbal processing was impaired. Deficits were also observed in fine motor dexterity, visuomotor integration, attention, and broad academic achievement.

Conclusions: This case study provides evidence for phenotypic differences between males and females with a SETD5 variation. While males exhibit ID, females may present with borderline intellectual functioning. Females may also display more fully developed social skills and a lack of repetitive stereotyped behaviors. Further research is warranted to clarify the nuances in the phenotypic presentation of females with a SETD5 variation.

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A. CLAWSON, M. BROWN, K. HILL, M. KRAVULSKI, L. MOORE, P. TURLINGTON & D. PLOETZ. Neurodevelopmental Profiles and Rehabilitation Outcomes in Beta-propeller Protein-Associated Neurodegeneration: Early Intervention Benefits.

Objective: Beta-propeller protein-associated neurodegeneration (BPAN) is a rare genetic condition associated with iron accumulation in the basal ganglia. The course of BPAN includes motor delays and global cognitive impairment in childhood, followed by decline in adolescence/adulthood. Limited information is known about the early presentation of BPAN and there is no known published literature discussing the efficacy of rehabilitation interventions. These case studies present the neurocognitive profiles of children with BPAN and their outcomes following multidisciplinary rehabilitation.

Participants and Methods: Two female patients (ages 3 and 4 years) with BPAN participated in outpatient day rehabilitation that included neurodevelopmental testing and physical, speech, and occupational therapies. Both patients demonstrated global developmental delays, diffuse white matter loss, and thinning of the corpus callosum. Rehabilitation outcomes were assessed using the Canadian Occupational Performance Measure (COPM) and Functional Independence Measure for Children (WeeFIM) at the start and end of treatment.

Results: On neurodevelopmental testing, both patients demonstrated skills falling well below age expectations, with relative strengths in visual skills compared to language skills and relatively stronger receptive than expressive language. On the COPM, parent perceptions of performance indicated that both patients demonstrated improvement in functional communication skills. WeeFIM scores remained relatively stable for both patients.

Conclusions: Neurodevelopmental testing supports the evidence that BPAN is associated with early cognitive deficits across areas of visual, motor, and language skills, consistent with global white matter loss. Measures of rehabilitation outcomes suggest limited gains in functional skills overall; however, parent perceptions suggest improvements in specific areas of concern. Thus, early rehabilitation may be useful in improving specific skills but may not impact overall functional skill development.

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J.L. CRAWFORD, V.A. DEL BENE, A. GÓMEZ-GASTIASORO, H. JINNAH & D.J. SCHRETLEN. The Relationship between White Matter Diffusion Indexes and the Phenotypic Traits of Lesch Nyhan Disease.

Objective: Lesch-Nyhan disease (LND) is a single gene, sex-linked metabolic disorder that is characterized by a dramatic and stereotyped neurodevelopmental syndrome that consists of hyperuricemia, severe dystonia, recurrent self-injury, and cognitive impairment. Compared to healthy controls, persons with LND have markedly reduced (~24%) white matter (WM) volume. In a related analysis (Del Bene, et al. INS 2019), we found that microstructural abnormalities also affected numerous WM tracts based on diffusion tensor imaging (DTI) analyses. Here we aimed to determine whether these abnormalities relate to aspects of the disease phenotype.

Participants and Methods: Participants with classic or variant LND (N = 14; 100% male; age 35±14 years) completed the Hopkins Verbal Learning Test (HVLT), Kaufman Brief Intelligence Test (KBIT), Benton Face Recognition Test (BFRT), and Brief Task of Attention (BTA). Study neurologist (HAJ) rated their dystonia severity using the Burke-Fahn-Marsden (BFM) scale. Participants underwent a 3T brain MRI with a diffusion-weighted sequence from which measures of fractional anisotropy (FA) were derived using FSL Tract Based Spatial Statistic and the randomise tool (TFCE correction) for multiple WM tracts. If behavioral measures showed a significant relationship with mean fractional anisotropy (FA), then other (non-FA) measures were also tested.

Results: The LND group showed a significant negative correlation between BFM dystonia severity and mean FA ($p < .05$, FWE), in a widespread WM area and the cerebellum. Positive correlations also were found between mean FA and HVLT learning ($p < .05$, FWE), and delayed recall ($p < .05$, FWE), involving every lobe of the cerebrum, right cerebellar WM, and basal ganglia WM. HVLT learning and delayed recall also showed a significant negative correlation with radial diffusivity, but not mean diffusivity.

Conclusions: Results highlight the potential role of WM fiber alteration in both the dystonia and verbal memory performance of people with LND.

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A. CUREWITZ, R. HUDOCK, L. KAIS, M. PIERPONT & R. PIERPONT. Variability in neuropsychological functioning in patients with downstream RAS pathway mutations.

Objective: Gene mutations within the Ras-mitogen-activated protein kinase (RAS-MAPK) signaling cascade have been associated with multiple genetic syndromes with varying degrees of neurocognitive impairment. Current research has focused on how specific molecular alterations in Ras pathway genes may predict the presence and severity of neurocognitive sequelae. Results from cohort studies suggest greater frequency of neurocognitive and adaptive impairment with more downstream mutations (i.e., Cesarini et al., 2009; Pierpont et al., 2010), with a high degree of variability noted across individuals with the mutations in the same gene (e.g., Pierpont et al., 2016). The aim of the current study was to examine the neurocognitive profiles of individuals with downstream RAS pathway mutations.

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Participants and Methods: Participants (ages 3-24) with *MEK2* (n=3), *BRAF* (n=4), and *KRAS* (n=6) mutations were administered neurocognitive evaluations, including measures of nonverbal intellectual ability, receptive vocabulary, and adaptive functioning. Nonverbal reasoning (DAS-II & KBIT-2) and receptive vocabulary (PPVT-IV) scores were compared alongside overall parent-rated adaptive skills (Vineland-3).
Results: More than half of the sample (54%) met criteria for intellectual disability, with significant neurocognitive variability among the remaining participants. Parent-rated adaptive functioning was generally higher in those patients whose verbal skills were relatively strong compared to nonverbal abilities. Further exploration of adaptive functioning skills indicated relative strengths in social skills for the majority of the current sample.
Conclusions: While there was a high degree of variability across participants, patterns of cognitive and adaptive functioning emerged based on the specific gene mutation. The *BRAF* mutation was associated with a greater degree of neurocognitive impairment. Study findings may assist with guiding treatment planning and family-based interventions.
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V.A. DEL BENE, J.L. CRAWFORD, A. GÓMEZ-GASTIASORO & D.J. SCHRETLEN. Reduced White Matter Microstructural Integrity in Lesch-Nyhan Disease.
Objective: Lesch-Nyhan disease (LND) is a rare, genetic, metabolic, neurodevelopmental disorder characterized by hyperuricemia, dystonia, cognitive impairment, and recurrent self-injury. Research has focused primarily on dopaminergic dysfunction and the basal ganglia. In an MRI study, we found white matter (WM) volume reduced by 24% in LND patients, as well as reduced volume in the inferior frontal WM. To date, the WM structural integrity in LND is unknown. We aimed to examine the microstructural integrity of WM in LND using diffusion tensor imaging (DTI). We hypothesized that patients with LND or a milder variant (LNV) would show decreased WM integrity compared to healthy controls, and that this reduction would be greater in LND than LNV.
Participants and Methods: Diffusion-weighted images were acquired for LND (n = 7), LNV (n = 7), and age-, sex, and raced-matched healthy adults (n = 13). FSL's Tract-Based Spatial Statistics was used to analyze WM group differences using the nonparametric statistic, Randomise, controlling for total intracranial volume and applying a conservative threshold-free cluster enhancement correction for familywise error (FWE).
Results: Results: The combined LND and LNV sample showed reductions in multiple WM fibers compared to healthy controls ($p < .05$, FWE) including the corpus callosum, cingulum, and superior longitudinal fasciculus (SLF). Contrasts of LND and LNV, as well as LNV and controls were not significantly different. Compared to controls, LND patients showed numerous regions of reduced WM integrity ($p < .02$, FWE, 28,988 voxels). These included the corpus callosum, cingulum, corona radiata, anterior thalamic radiation, and SLF.
Conclusions: These results represent the first evidence of reduced WM integrity in LND. Abnormalities affected multiple major inter- and intra-hemispheric WM fiber tracts. Mirroring our previous findings, WM integrity deficits in LNV were milder than in classic LND. This novel finding has implications for the understanding of LND.
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A. DEL CASTILLO, A. ARMOUR & K.S. WALSH. Motor and Executive Dysfunction Drives Elevated Restrictive and Repetitive Behavior Ratings in Children with Neurofibromatosis Type 1 (NF1) as Compared to Children with Idiopathic Autism Spectrum Disorders (ASD).
Objective: Social problems are highly prevalent in children with NF1, engendering interest in similarities between NF1-associated symptoms and those in idiopathic ASD. The Social Responsiveness Scale (SRS) is a symptom screener for ASD, and elevations are documented in children with NF1, with unexpected spikes on the Restricted Interests and Repetitive Behaviors (RRB) scale. We aim to analyze item-level data to examine symptoms driving elevations and compare them to children with idiopathic ASD.
Participants and Methods: This is a cross-sectional, retrospective study of population-based samples of children with NF1 (n=33, age M=10.5, SD=5.68; 46% male) and ASD (n=33, M=10.5, SD=4.79; 49% male) age and gender matched. Parent-reported SRS was collected at clinic intake.
Results: Children with ASD have significantly greater problems in all aspects of social functioning assessed by the SRS than children with NF1 ($F(1,64)=30.39$, $p=.000$), including RRB ($F(1,64)=28.31$, $p=.000$). Contributing problems associated with elevated RRB in NF1 showed elevations driven primarily by endorsement of motor problems (70%) and cognitive inflexibility (70%). Reports of stereotypic behaviors were rarer (30%). In contrast, being regarded as weird/odd was a prominent problem (85%) for children in the ASD group.
Conclusions: In children with NF1, it appears that well-known deficits in executive functioning and motor skills are contributing to elevations in RRB scores as opposed to stereotyped or odd behaviors, which contribute most to elevations in ASD. Despite recent reports of increased rates of ASD in NF1, these results suggest unique behavioral patterns driving elevated ASD symptoms between the groups. This may explain the differences in clinical presentation between the groups. Future research should more fully examine ASD symptom profiles between these groups with the aim of understanding etiology and developing specific interventions.
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D. GLAD, B. YUND, K. LEE, C. CASNAR, K. RAY & B.P. KLEINTASMAN. Social Functioning in Children with Neurofibromatosis Type 1: A Longitudinal Investigation.
Objective: Challenges with social functioning, such as poorer social skills compared to same-aged peers and poorer social outcomes compared to unaffected siblings, have been identified in the literature describing children with neurofibromatosis type 1 (NF1). The majority of investigations have included older children and use cross-sectional methodology. The current aim was to examine social skills in the preschool and school age years in children with NF1 longitudinally, with a focus on the stability of social skills challenges and interrelation with cognitive functioning.
Participants and Methods: Participants included 27 children with NF1, along with their parent. Children were assessed at two time points: preschool years (T1; ages 3-7; M=4.75 years, SD=1.31) and school age years (T2; ages 9-13; M=10.65 years, SD=1.55). The Social Skills scale on the Social Skills Rating System (SSRS) and Social Skills Improvement System (SSIS) were used to assess social functioning. The Differential Ability Scales-Second Edition (DAS-II) was used to assess cognitive ability (General Cognitive Ability standard score; GCA).
Results: 33.3% of children with NF1 showed social difficulties in the preschool years and 25.9% showed social difficulties in the school age years, with no significant effect of time of assessment ($t(26)=.49$, $p=.63$). Social skills standard scores did not differ significantly from the preschool to school age years ($t(26)=1.15$, $p=.26$). Scores from the preschool to school age years were significantly correlated ($rho=.35$,

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p=.035). Social skills were not significantly correlated with cognitive function either concurrently or longitudinally (T1 SSRS-T1 DAS: *rho*=.22, p=.139; T1 SSRS–T2 DAS: *rho*=-.04, p=.42; T2 SSIS–T2 DAS: *rho*=0.06, p=.39).

Conclusions: Early social difficulties were related to later social difficulties, such that social difficulties, when present, persist over time. Social functioning was not associated with cognitive function. Implications of these findings will be discussed.

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M. GODFREY, M. UDHNANI & N. RAITANO LEE. Neuropsychological and Behavioral Profile of Mosaic Trisomy 14: A Case Study.

Objective: Genetic abnormalities of chromosome 14 are rare and only 30 cases of Mosaic Trisomy 14 have been published. Past research has examined the physical presentation of Mosaic Trisomy 14, yet research has not examined the cognitive and behavioral features of this genetic disorder. Therefore, the current study examined the neurocognitive and behavioral profile associated with Mosaic Trisomy 14.

Participants and Methods: The current study examines an 11-year-old female with Mosaic Trisomy 14 (Mental Age [MA]=6.21). Her performance was compared to females (n=9) with Intellectual Disability (ID) due to Down Syndrome (DS) matched on chronological age (CA M=12.38[1.46]; MA M=5.81[1.06]). Participants completed measures of intelligence (KBIT-2), language (WIAT-III and TACL-4), attention (WISC-IV-R), and memory (NEPSY-2). Additionally, caregivers of participants completed reports of executive functioning (BRIEF-2), adaptive functioning (VABS-II), and communication (CCC-2). Effect sizes were calculated comparing the performance of the participant with Mosaic Trisomy 14 to the DS group, and large effect sizes were used to identify relative strengths (d>.8) and weaknesses (d<-.8) for the case.

Results: The case was comparable to the DS group on tasks of verbal and nonverbal intellectual functioning, oral discourse comprehension, auditory and visual attention, visual memory, and executive behavioral and emotional regulation skills. Areas of relative weakness in comparison to DS peers included vocabulary knowledge and parent report of structural language and adaptive functioning. In contrast, parent report indicated a relative social strength in comparison to peers with DS.

Conclusions: The first examination of the cognitive and behavioral profile associated with Mosaic Trisomy 14 indicate cognitive abilities were impaired, and comparable to DS peers, with a relative strength in social behavior. Thus, Mosaic Trisomy 14 may present similarly to those with ID and may be associated with relative strengths in social functioning.

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V.A. GRUNBERG & S.C. MURPHY. Genetic Secrets: The Neurocognitive Profile of Xia-Gibbs Syndrome.

Objective: Xia-Gibbs Syndrome is a rare genetic disorder discovered in 2014 caused by mutations in the AHDC1 gene. Approximately 70 individuals have been identified worldwide, the majority of them children. Reported symptoms include developmental delay, poor muscle tone, respiratory issues, sleep apnea, seizures, ataxia, scoliosis, and behavioral difficulties. Due to the rarity of this condition, little is known about the neurocognitive profile in effected youth.

Participants and Methods: The examined case study is a 5-year-old boy born overseas and found abandoned at approximately 17 months old. No prior history is known. He spent time in orphanages before being adopted at age 4 and moving to the United States. At the time of adoption, he used a few words in his home language. Early Intervention services were immediately implemented. Genetic testing confirmed the diagnosis and he was referred for neuropsychological evaluation.

Results: Overall, his estimated level of intellectual functioning was well below age expectations (DAS-II GCA=43). Expressive and receptive language skills were also well below age expectations (19-months, 2-2.5 years respectively). His mother placed his adaptive functioning in the low range, with particular difficulty with self-care, health and safety, and self-direction. Overall, these findings are consistent with the limited literature on Xia-Gibbs, and when combined with his 1.5 years of English exposure, these factors indicate greater impairment in functioning than any would individually.

Conclusions: Although research is currently ongoing, this individual's presentation and pattern of neuropsychological findings is in line with current conceptualization of development in Xia-Gibbs Syndrome. This case study adds to extant literature by highlighting the neuropsychological profile for one of approximately 70 individuals in the world with this rare disorder. It is intended that this child will be followed over time to better delineate his profile of strengths and weaknesses.

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D. HALLIDAY & C. TANEJA. Neuropsychological Profile for Chromosome Deletion 16q22.3: A Rare Case Study.

Objective: Chromosome deletions typically result in protein dysfunction, with the potential for a host of downstream developmental abnormalities, including possible malformation, deformation, disruption and/or dysplasia. For certain deletions that occur with relative frequency, a syndrome profile including a predictable trajectory of neurodevelopmental and cognitive symptoms is available to healthcare professionals and families; however, in rarer deletions, there is a paucity of such documentation, making treatment decisions more challenging.

Participants and Methods: In this case study, we followed an 8-year-old boy with de novo 16q22.3 deletion and previous diagnosis of moderate intellectual disability at age 5, referred for neuropsychological evaluation, whose EEG and MRI scans were within normal limits. Pregnancy was high-risk due to maternal age at conception and numerous interventions in early life were implemented.

Results: Findings were consistent with mild intellectual disability and nonverbal learning disability (NVLD), with strengths in verbal intelligence, verbal memory, cognitive flexibility with language and language arts. In contrast, visual-spatial perception, fluid reasoning and visual memory were less well-developed and significant deficits were observed in left hand fine motor dexterity and tactile sensation, verbal reasoning based on social pragmatics and applied mathematics. Notably, this individual had a pervasively positive and contented disposition, with no identified mental health concerns.

Conclusions: This case appears to be the first in the literature to report a detailed neuropsychological evaluation of 16q22.3 deletion, aside from a coarse neurological overview. These findings diverge from case studies of proximal interstitial 16q deletions (16q24) documenting either enlarged cerebellum with symptoms of apraxia, or specific language impairment. Interventions facilitating successful adaptation as well as potential long-term implications in the context of NVLD will be discussed.

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K.E. HASSARA, K. BALL & D.A. PEARSON. Neuropsychological Functioning in an 8-year-old Male with Leigh Syndrome: A Case Study.

Objective: Leigh syndrome (subacute necrotizing encephalomyelopathy) is the most common neurodegenerative mitochondrial disorder in children. Children with Leigh syndrome have a median lifespan of 2.4 years. Neuropsychological deficits in mitochondrial disorders are common and varied. There is little existing research that highlights the neuropsychological deficits associated with Leigh syndrome. Neuropsychological functioning of an 8-year-old male with Leigh syndrome with cerebellar involvement is presented.

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Participants and Methods: Initial imaging indicated extensive bilateral lesions of the basal ganglia. The patient experienced multiple metabolic strokes and received a clinical trial medication to reduce encephalitis. Limited testing at 4 years included SB-5, PLS-5, VABS-2-II, and behavioral/emotional measures. Neuropsychological testing at age 8 included SB-5, WIAT-III, PPVT-4, EVT-2, CPT-3, NEPSY-2, Beery VMI-6, ABAS-3, and behavioral/emotional measures.
Results: Test results revealed significant declines in overall cognitive and language functioning with worsening motor concerns. Relative weaknesses were noted in working memory, processing speed, academics, memory, learning, fine motor coordination, visual perception, visual motor integration, and attention. Rating scales were notable for elevated symptoms of anxiety.
Conclusions: Extensive cognitive and motor declines were noted over time in this child with a progressive, degenerative metabolic disorder. Further research may help clarify the neuropsychological deficits associated with Leigh syndrome to inform treatment recommendations in older patients with the disease.
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V.J. HINTON & R.J. FEE. Developmental Lag in Multi-word Comprehension in Boys with Dystrophinopathy.
Objective: Objective: To examine the developmental trajectory of language comprehension skills in boys with dystrophinopathies (Duchenne and Becker Muscular Dystrophy, DMD). Boys with DMD have a distinct cognitive profile that presents with lowered verbal IQ, and generalized academic and executive difficulties. Cross sectional examination of performance of a large group of children with DMD and their unaffected siblings (SIB) on receptive language tasks with increasing verbal comprehension demands was done.
Participants and Methods: Methods: 161 boys with DMD and 98 SIB (age range 3 – 16) were given the The Token Test for Children (TTC), and the Peabody Picture Vocabulary Test (PPVT). Repeated measure ANOVA across levels with post hoc between group comparisons were run at different test levels. Data were plotted longitudinally.
Results: Results: Significant between group differences were found for all levels of TTC, but the magnitude of difference increased significantly with test level, such that as language demands increased, performance decreased in the DMD group. (DMD mean z score: TTC 1 = -0.34, TTC 2 = -0.40, TTC3 = -0.56, TTC4 = -0.62, TTC 5 = -0.91). Further, when performance was compared across age groups, greater differences were found among younger ages.
Conclusions: Conclusions: For the general population, performance on single word comprehension increases at a relatively steady state from 3 to 16 years, while performance on measures of multi-word comprehension makes steep gains between 3 and 7 years of age and remains relatively constant thereafter. Acquisition of single word receptive skills is comparable for boys with DMD to that of their siblings. In contrast, gains in multi-word comprehension come about two years later than those of their siblings, thus having the greatest functional impact among younger boys.
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T. KHANG, T.O. ALABI & M. SEMRUD-CLIKEMAN. Neuropsychological Functioning in a Sample of Children with Fanconi Anemia or Aplastic Anemia.
Objective: This study presents data from 18 neuropsychological evaluations from children who have been diagnosed with either Fanconi anemia or idiopathic aplastic anemia with a goal of disseminating known information on populations that are not studied well with respect to associated cognitive effects.
Participants and Methods: Data were collected from primarily pediatric patients with Fanconi anemia (n = 12) or aplastic anemia (n = 6) who have not undergone stem cell transplant. The mean age was 11 years old. Select standardized scores from rating forms or direct testing were included to capture domains of overall IQ, working memory, processing speed, verbal memory, executive functioning, attention, visual-motor integration, fine motor dexterity, and adaptive functioning. Lab results (red blood cell count, hemoglobin) were also collected.
Results: Hemoglobin level and RBC were low. There was a statistically significant positive correlation between RBC and hemoglobin level. Scores on measures of attention and executive functioning were significantly positively correlated while verbal memory was negatively correlated with visual-motor integration. Overall average functioning was found in several domains (IQ, adaptive behavior, working memory, attention, and executive functioning). Visual motor integration and fine motor dexterity were found to be in the low average range.
Conclusions: Results show intact functioning with the exception of visual-motor and fine motor tasks. Lower motor scores are consistent with prior studies of anemia and may also be related to hand/arm abnormalities often seen in Fanconi anemia. In conclusion, these findings indicate that children with lower levels of RBC and hemoglobin are at risk for dexterity and visual-motor integration difficulties and neuropsychological evaluations are strongly recommended.
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B. MACONE & B. SPRINGATE. Baseline Executive Functioning Predicts Current and Future Depression in Adults with Prodromal Huntington's Disease.
Objective: To better understand how baseline executive functioning (EF) relates to depression symptoms in Huntington's disease (HD), both concurrently and over time.
Participants and Methods: *Participants:* 1,143 adults with gene-positive (≥36 CAG repeats) and prodromal HD (UHDRS Motor ≤10) who participated in the Enroll-HD study. *Materials:* Executive functioning: Stroop Test, Trail Making Test, Phonemic fluency (raw scores and errors). Depression: Hospital Anxiety and Depression Scale-Depression subscale. *Analyses:* Multiple regression analyses were conducted to examine the relationship between EF scores at baseline and depression scores at baseline, Follow-Up 1, and Follow-Up 2. Models controlled for age, education, and time elapsed since baseline.
Results: A model predicting depression scores at baseline for prodromal HD patients was significant overall [$F(11, 1131)=8.31$, $p<.001$] and explained approximately 8% of variance in depression scores at baseline. A model predicting depression scores at Follow-Up 1 (382±60 days later) was significant [$F(12, 600)=2.94$, $p=.001$] and explained approximately 6% of depression variance. A model predicting depression at Follow-Up 2 (719±88 days) was significant [$F(12, 261)=3.07$, $p<.001$] and explained approximately 11% of depression variance.
Conclusions: Findings replicate and extend prior research demonstrating a link between EF and depression severity. Results support a model wherein baseline EF predicts depression, both concurrently and up to two years later. Effects were subtle but statistically significant, and were persistent over time. Limitations included imperfect education estimates, low overall depression in the sample, high attrition, and inability to account for treatment effects.
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C. PAPALEO. Neuropsychological Functioning in Individuals with Phenylketonuria Assessed through Measurement of Brain Biomarkers with MRI Spectroscopy.
Objective: Long-term exposure to excess blood phenylalanine (Phe) and decreased amounts of tyrosine (Tyr), a direct metabolite of Phe, in individuals with phenylketonuria (PKU) is associated with neuropsychological deficits. However, blood Phe and blood Try measured on the day of neuropsychological testing are not associated with functioning. Previous studies suggest that brain accumulations of these metabolites

may explain the variability in outcomes. The objective of this interdisciplinary study was to examine accumulations of blood and brain Phe and Tyr and their association with neuropsychological functioning in individuals with PKU.
Participants and Methods: 5 individuals with PKU were assessed and compared to 5 age- and sex-matched healthy control subjects (mean age = 16.13 + 3.31 years). Two-dimensional shift correlated magnetic resonance spectroscopy (COSY) was used to measure brain amino acid levels more precisely in the white and gray matter of 2 distinct brain regions than was previously possible using traditional magnetic resonance spectroscopy methods.
Results: Individuals with PKU had higher mean concentrations of blood Phe compared to controls (mean = 552 + 312 μmol/Lvs. 66 + 12 μmol/L) and lower concentrations of blood Tyr (mean = 51 + 40 μmol/L vs. 59 + 23 μmol/L). Individuals with PKU demonstrated poorer performance in all neuropsychological domains evaluated.
Conclusions: Further analyses will describe the ratios of blood Phe:brain Phe and blood Tyr:brainTyr and how these ratios differ among individuals with PKU and healthy controls. Associations between neuropsychological testing results and brain Phe and brain Tyr will also be described. COSY may be useful in documenting the brain effect of novel treatments for PKU in clinical trials by providing quantitative measurement of brain metabolites.
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A.A. PARIDES & L.D. ROSENSTEIN. Neuropsychological Functioning in a Case of Marfan Syndrome with Cerebrovascular Risk Factors.
Objective: Marfan Syndrome (MFS), an autosomal dominant condition, is known to affect many organ systems, including skeletal, cardiovascular, ocular, and pulmonary systems (Loeys, et al., 2010). However, few studies have examined potential neuropsychological implications for affected patients (Gritti, et al., 2015) and cardiovascular issues associated with MFS raise the risk of cerebrovascular compromise. We present case findings to highlight potential cognitive issues secondary to the associated risks.
Participants and Methods: The patient, a 52-year-old man with 8½ years of education, had aortic valve replacement in his 20's with chronic anticoagulation therapy in addition to other cerebrovascular risk factors, including hypertension, hyperlipidemia, and Type 2 Diabetes. MRI revealed left frontal encephalomacia. Two neuropsychological evaluations were completed 2½ years apart to address memory concerns.
Results: Findings were stable between the two evaluations, with deficiencies in visual scanning speed, span of attention, divided attention, working memory, encoding, and visual constructional drawing. Object recognition, form discrimination, right/left orientation, language, and motor programming were within expectation. Behavior and adaptive functioning were within normal limits by observation and self-report. The patient reported symptoms of moderate depression with fatigue and poor energy. While mood and reported sleep disruption may have contributed to some of the deficits, the cerebrovascular risks and educational history were believed to be more significant factors.
Conclusions: This case expands upon current knowledge by highlighting potential neuropsychological implications related to MFS, especially given the cardiovascular abnormalities, as well as the need for multidisciplinary management of care. As evidenced in the literature, difficulties with cognitive functioning in MFS could negatively impact quality of life and has implications for those involved in all aspects of clinical care (Ratiu, et al., 2018).
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A.A. ROUHANDEH, E. WILKINSON, H. GROSMAN, C. MCLAUGHLIN, M. ROWE, M. GORENSTEIN-HOLTZMAN, D. HALPERN, R. LOZANO, Y. FRANK, M. MULHERN, J. BUXBAUM, S. DE RUBEIS, J. FOSS-FEIG, P.M. SIPER & A. KOLEVZON. Case Report: 20-Month-Old Female with an Intragenic SHANK3 Duplication.
Objective: Phelan-McDermid syndrome (PMS) is caused by a deletion or mutation in the SHANK3 gene on chromosome 22 and is characterized by intellectual disability, delayed or absent speech, motor deficits, hypotonia, and symptoms of autism spectrum disorder (ASD). Medical comorbidities are more common in PMS and may include gastrointestinal problems, epilepsy, congenital heart disease, and recurrent upper respiratory tract infections. While the phenotype associated with pathogenic SHANK3 deletions/mutations is well described, consequences of an intragenic SHANK3 duplication have not been reported.
Participants and Methods: Comprehensive phenotyping was completed for a 20-month-old female with a 17 kb intragenic *SHANK3* duplication diagnosed through a chromosomal microarray and hypothesized to be pathogenic. Standardized assessments were administered to capture ASD symptoms (Autism Diagnostic Observation Schedule, 2nd edition), adaptive behavior (Vineland Adaptive Behavior Scales, 3rd edition), and developmental functioning (Mullen Scales of Early Learning). A psychiatric evaluation, physical exam, neurological exam, and dysmorphology exam were also conducted.
Results: The child did not meet DSM-5 criteria for ASD and scored in the range of little-to-no concern on diagnostic testing. Developmental scores were average across domains, with gross motor and visual reception representing strengths, and expressive language representing a relative weakness. Moderate delays in adaptive functioning were reported, with a relative strength in the socialization domain. Medical history is significant for small stature, reactive airway disease and gastroesophageal reflux disease. The dysmorphology exam noted several dysmorphic features.
Conclusions: This case highlights the need to characterize individuals with intragenic *SHANK3* duplications in comparison to individuals with deletions/mutations in *SHANK3*. Long-term follow-up is warranted to monitor the effects of this duplication in *SHANK3*.
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M. ROWE, L. TANG, A. DURKIN, D. HALPERN, J. ZWEIFACH, J. FOSS-FEIG, H. VOULGARAKIS, J. BUXBAUM, A. KOLEVZON, S. DE RUBEIS & P.M. SIPER. Characterizing Language in Children with ADNP Syndrome.
Objective: ADNP (or Helsmoortel-van der Aa) syndrome is a rare neurodevelopmental disorder caused by mutations in the Activity Dependent Neuroprotective Protein (ADNP) gene. ADNP mutations represent a common single-gene cause of autism spectrum disorder and intellectual disability. This study characterizes language ability in children with ADNP syndrome.
Participants and Methods: Eight children with ADNP syndrome (3 female, ages 4-10) completed standardized testing, including the Mullen Scales of Early Learning, Expressive Vocabulary Test, Second Edition (EVT-2), Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4), and Vineland Adaptive Behavior Scales, 2nd or 3rd Edition, Survey Interview Form. Language milestones were obtained from the Autism Diagnostic Interview-Revised.
Results: Language milestones were delayed in all participants. Average age of first word and phrase were 32 and 61 months, respectively. At the time of evaluation, six children (75%) were nonverbal or minimally verbal, one child used phrase speech, and one used fluent speech. Eighty-three percent of children had higher age equivalents on the Mullen receptive language scale (*M*=28.83, *SD*=11.96) compared to the expressive language scale (*M*=19.67, *SD*=11.11). Of participants able to complete the PPVT-4 and EVT-2, 80% (4/5) had higher standard

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scores on the PPVT-4 (*M*=65.20, *SD*=10.85) compared to the EVT-2 (*M*=55.80, *SD*=15.16). On the Vineland, the majority of parents (75%) reported stronger expressive language, leading to higher age equivalents (*M*=25, *SD*=14.98) for expressive language than receptive language (*M*=22.63, *SD*=7.60) with great variability in expressive language.
Conclusions: Results show significant language delays across participants, with the majority of children presenting as minimally verbal. In contrast to parent interview, scores from clinician administered assessments indicate that children with ADNP syndrome may understand more than they are able to express, which may have important implications for behavioral and educational interventions.
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E.E. SMITH, A.M. HERNANDEZ, A.A. HOLLAND, J.M. PASCUAL & P.L. STAVINOHA. Adaptive Functioning in Patients with Glucose Transporter Type 1 Deficiency.
Objective: Examine the adaptive functioning profile of patients with a rare genetic disorder, Glucose Transporter Type 1 Deficiency (G1D).
Participants and Methods: Patients (n=47) and parents attended a G1D educational conference where parents voluntarily and anonymously completed an age-appropriate Adaptive Behavior Assessment System Third Edition (ABAS-3) and provided basic demographic information. The General Adaptive Composite (GAC) as well as the Conceptual, Practical, and Social domain scores were computed. Three age groups were defined: early childhood (0-5), school age (6-17), young adult (18+). Kruskal-Wallis Test and linear regressions assessed group demographic differences. One-sample t-tests compared the ABAS-3 standard scores to normative scores. Test values of 100 and 85 were used as comparisons to represent average and one standard deviation below average performance. Mean standard scores for each age group were used in slope analysis to estimate trajectory of adaptive functioning.
Results: There were no significant age group differences in demographics. Full sample analysis revealed ABAS-3 standard scores were significantly lower than the normative mean of 100 (p<.001) for GAC (t_{GAC}(45)=-9.98), Conceptual (t_C(46)=-9.00), Social (t_S(45)=-6.04), and Practical (t_P(46)=-9.61) and significantly lower than 85 (p< .016) for GAC (t_{GAC}(45)=-3.53), Conceptual (t_C(46)=-2.50), and Practical (t_P(46)=-3.63) but not Social (t_S(45)=0.650, p=.519). Slope analysis suggested negative age-related trends for GAC (m_{GAC}=-.29), Conceptual (m_C=-.45), Practical (m_P=-.59), and Social (m_S=-.26).
Conclusions: Adaptive functioning has not been sufficiently characterized in G1D. All participants were rated below the normative sample (100) in all domains of adaptive functioning, and significantly below one standard deviation (85) in Conceptual and Practical domains, with a relative strength in the Social domain. Negative adaptive function slopes suggest patients with G1D may fail to meet developmental expectations over time.
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G.A. STEFANATOS & R. VALLARO. Neuropsychological Findings in a Rare Case of a 4p.16 Chromosome Deletion.
Objective: Delineating the cognitive consequences of genetic anomalies can inform our understanding of the role of particular genes on brain development. Here, we describe an unusual neurobehavioral phenotype in an adolescent female (FN) with a rare genetic anomaly involving chromosome 4p16. Genome-wide array analysis revealed an interstitial deletion in the short arm of chromosome 4 between points p16.1 and p16.2. but sparing the Wolf-Hirschhorn critical region (p16.3).
Participants and Methods: FN (15yrs) was evaluated with a full neuropsychological battery assessing intelligence, academic achievement, adaptive behavior, perceptual and motor skills, spatial abilities, language and executive function.
Results: Scores on Intelligence and academic achievement subtests varied from the deficient to average range. Difficulties were evident on measures working memory, expressive language, verbal processing, spatial integration and spatial planning. The most striking impairment involved executive function, including remarkable difficulties with organization, planning, adapting, problem solving and processing speed. Rate of presentation on a continuous performance task had to be decreased from the usual parameters (1/sec) to allow her to perform the task. Marked cognitive inflexibility compromised peer interactions and her ability to adapt to everyday demands.
Conclusions: Deletions of the short arm of chromosome 4p16.3 have been associated with intellectual deficiency, physical stigmata particularly in the face, delayed growth and development, and seizures. Despite a less severe and more nuanced pattern of cognitive impairment, and only mild stigmata, FN demonstrated significant delays in several area of cognitive function. The atypical neurocognitive disorder featured prominent executive dysfunction that posed major constraints on her ability to process complex information and respond to demands in an effective and adaptable manner. Implications of these findings are discussed.
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Other

K. DAS, R. KAUR, S. SHARMA & G. PRAKASH. A Quasi-experimental study to assess the effectiveness of an interventional package for the management of insomnia among Hemato-Oncological patients admitted in selected wards of tertiary Hospital in Northern India.
Objective: The study was undertaken to identify insomnia among Hemato-Oncological patients and to evaluate the effectiveness of an interventional package for management of insomnia among those who were admitted in selected wards of Nehru Hospital, PGIMER, Chandigarh.
Participants and Methods: The research approach was quantitative and research design used was quasi-experimental. The tools used were socio-demographic and clinical data sheet of the patients along with Insomnia Severity Index and sleep diary. Randomization of wards was done to avoid bias. Sample size was 60, 30 patients each in experimental and control group. Interventional package included education and written information about sleep hygiene, stimuli control, Jacobson's Progressive Muscle Relaxation technique (JPMR) and practice of JPMR for 21 days. Pre-intervention assessment of insomnia was done in both groups with insomnia severity index. Intervention was administered to experimental group only while the control group received routine care. Assessment of insomnia was done among both groups on 7th, 14th and 21st day of intervention.
Results: The present study showed significant improvement in insomnia severity score as after intervention in the experimental group mean score reduced from 17.70 to 8.77 by the 21st day of intervention. The result was statistically significant as p-value was < 0.001. In the intergroup comparison of insomnia, severity score showed statistically significant change in experimental group (p value < 0.001). After intervention 36.7% subjects reported no difficulty in falling asleep whereas (43.3%) subjects improved their difficulty in staying asleep. Half of the subjects were able to obtain sleep for >5 hours and also were satisfied with their sleep.
Conclusions: Thus, the findings of the study reveal that the interventional package was effective for the management of insomnia.
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Invited Symposium 2. Cross Cultural Perspectives on Reading Disabilities

Chair: Robin L. Peterson

Presenters: Markéta Caravolas, Cláudia Cardoso-Martins, Julie A. Washington

10:15–11:45 a.m.

R.L. PETERSON, M. CARAVOLAS, C. CARDOSO-MARTINS, M. MICHALICK-TRIGINELLI & J.A. WASHINGTON. Cross Cultural Perspectives on Reading Disabilities.

This symposium addresses reading development and disabilities across languages and cultures, highlighting both universalities and cultural constraints on literacy acquisition. Our international panel of speakers will present data on elementary school children who are speakers of six different languages/dialects across three continents. Dr. Markéta Caravolas will share longitudinal data tracking children's literacy development from kindergarten to 2nd grade in four European orthographies (English, Spanish, Czech, Slovak) that vary considerably in their letter-sound consistency. Dr. Claudia Cardoso-Martins will present data for 2nd and 3rd graders with reading disabilities who speak Brazilian Portuguese. Importantly, the pattern of results was similar for typically developing and disabled readers and showed letter-sound consistency impacts the rate of literacy acquisition, but across written systems, reading and spelling are supported by similar cognitive skills. Dr. Julie Washington will present data from a longitudinal project tracking language and literacy development in low-income African American children from 1st through 5th grade. Literacy outcomes within this group varied and were related to both spoken dialect (mainstream English versus African American English) and oral language skills. Her presentation will also address factors that contribute to underidentification of impoverished African American children as learning disabled. Dr. Robin Peterson will serve as discussant. All four speakers will consider the implications of their research for diagnosis and treatment of reading disabilities. Overall, the symposium will demonstrate impressive universalities in literacy acquisition, but also show that cultural-linguistic context can influence both children's risk for various types of reading difficulty as well as their access to appropriate diagnosis and intervention services.

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M. CARAVOLAS. Universals and Specifics of Reading Development in Different European Languages.

Many European languages use alphabetic orthographies, and these can vary extensively in their transparency, or *letter-sound consistency*. An important question in cross-linguistic research on literacy development concerns the impact that orthographic consistency may have on the neuropsychological *predictors*as well as on the *patterns*of alphabetic reading development. In this presentation, I report on a series of studies that directly compared reading development in English, with its inconsistent orthography, and Spanish, Czech and Slovak, all with relatively consistent orthographies. The studies tracked children's reading development from kindergarten to the end of grade 2, and focused on the cognitive precursors and correlates of early word reading skills, on the growth patterns of silent and aloud reading skills, and on the pathways to reading comprehension. These studies demonstrate that while orthographic consistency affects the rate of alphabetic reading and spelling acquisition, these skills are underpinned by a language-general set of cognitive skills. The implications of these findings for the identification of children at risk of literacy difficulties, as well as for their remediation will be discussed.

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C. CARDOSO-MARTINS & M. MICHALICK-TRIGINELLI. Characteristics of Early Reading Disabilities in Brazilian Portuguese.

In languages with more transparent orthographies than English, reading disability (RD) is characterized by spelling errors and slow, albeit correct reading. Indeed, Wimmer (1993) argued that by 2nd to 3rd grade, children with RD learning to read in German already show rather good word decoding skills. The present study examined the extent to which this also is true of Brazilian Portuguese (BP), an orthography that, like German, is characterized by highly consistent grapheme-phoneme correspondences but less consistent phoneme-grapheme correspondences. We also examined cognitive correlates of reading development, including phoneme awareness (PA), rapid naming (RN), and verbal short-term/working memory (VSTM). Participants were two groups of 58 2nd and 3rd graders (M = 8;3 years, SD = 7 months), individually matched for age, grade and school: a group with RD and a group of typically developing (TD) readers. Participants completed tests of reading, spelling, verbal and non-verbal ability, PA, RN, and VSTM. Results showed that half of the children with RD performed at grade level on the word reading accuracy test, although they still scored below their TD matches. Most of the remaining children with RD scored more than1.25 SDs below grade level on the reading test. In a logistic regression examining the predictors of RD, only PA and RN predicted RD reliably. Thus, in line with other studies (e.g., Caravolas, this proposal; Landerl et al., 2012), we found that the cognitive predictors of RD in BP appear similar to those of other alphabetic orthographies, even though the rate of word reading accuracy problems is lower than in English.

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J.A. WASHINGTON. Language, Dialect, and Literacy Development in Low-Income African American Children.

African American children growing up in poverty are at high risk for difficulty with academic attainment. Literacy attainment has been identified as particularly problematic with approximately 83% of African American 4th graders reading at a basic level or below (NAEP, 2016). African American children growing up in poverty who speak the dialect African American English (AAE) have still greater risk for development of poor literacy skills as both dialectal variation and impoverished general oral language skills can impact their reading and writing. Despite the high rate of reading failure among impoverished African American children they are less likely to be identified as learning disabled than their higher income, mainstream English-speaking peers. When poor children don't read, the assumption is most often that they are unable to read because they are poor. African American children are disproportionately poor, making them much less likely to be identified with LD as their higher income, mainstream English-speaking peers (Morgan et al, 2015). In this population, the intersection of race, poverty and linguistic difference appears to contribute significantly to underrepresentation in the LD category. The results of a longitudinal project focused on the growth of language and literacy skills in a large sample (N =896) of 1st through fifth grade, low income African American boys and girls are presented. Findings from this investigation support the presence of an important relationship between dialect and language and dialect and reading such that changes in dialect use may be driven by oral language skills and acquisition of reading skills. Outcomes are discussed relative to the variation that exists within this group of students and implications for identification of disabilities and for educational placement.

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Paper Session 11. Multiple Sclerosis

Moderator: Molly Zimmerman

10:15–11:45 a.m.

C.A. F. ROMAN & P. ARNETT. Cognition and Structural Connectivity in Multiple Sclerosis: Relationship Between Graph Theory Metrics and Neuropsychological Performance.

Objective: Cognitive deficits are highly prevalent in multiple sclerosis (MS). Damage to white matter tracts has been associated with poorer neuropsychological performance across a number of cognitive domains. When examining the relationship between white matter and cognition, however, many studies focus on regional white matter or what the final score of a neuropsychological test can tell us, but it has been well established that the brain functions via connections *between* regions, making it crucial to look at structural networks in order to gain better insight into brain-behavior relationships. The current study utilizes graph theory to investigate the relationship between neuropsychological functioning and structural connectivity in MS.

Participants and Methods: Forty-three individuals with MS were scanned during a DTI protocol and evaluated for cognitive functioning. DSI Studio was used to implement a whole brain deterministic tractography algorithm. Graph theory metrics (clustering, small worldness, global and local efficiency, assortivity) were calculated to examine white matter network properties. Neuropsychological evaluation included tests of processing speed, working memory, executive functioning, and visual and verbal memory. In addition, process variables (e.g., omissions, commissions, repetitions, etc.) were examined.

Results: After controlling for age and education, we found that greater global and local efficiency were significantly associated with better working memory performance. In addition, assortivity was found to be related to processing speed and immediate and delayed spatial recall. Regarding process variables, number of omissions on a working memory task was negatively significantly related to global efficiency of structural networks.

Conclusions: To the authors' knowledge, this is among the emerging studies examining the relationship between structural brain networks and neuropsychological functioning using a graph theoretical framework, pointing to possible structural profiles for cognition in MS.

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T. FUCHS, S. ZICCARDI, R. BENEDICT, A. BARTNIK, R. CAMPBELL, J. ESCOBAR, D. OSHIP, J. POL, C. WOJCIK, F. YASIN, B. WEINSTOCK-GUTTMAN, R. ZIVADINOV & M. DWYER. Patterns of Structural and Functional Connectivity Predict Response to Cognitive Rehabilitation 2 Years Later in Multiple Sclerosis.

Objective: To establish baseline patterns of white matter tract disruption and functional connectivity which predict efficacy of restorative cognitive rehabilitation in people with multiple sclerosis (MS).

Participants and Methods: 51 people with MS (35 relapsing-remitting, 16 progressive) were recruited for a 12-week restorative, home-based, cognitive rehabilitation program. Participants were recruited from a larger study, for which MRI had been previously collected (mean=2.2 years prior). Each participant underwent neuropsychological evaluation pre- and post-rehabilitation. Lesion-based white matter tract disruption was measured between pairs of gray matter regions and functional connectivity was also assessed in a sub-group of individuals for which resting-state fMRI was available (n=25). Network-based statistics and dual-regression techniques were applied to determine patterns of structural and functional connectivity which predict treatment efficacy.

Results: Subjects exhibited a statistically significant increase in cognitive processing speed following rehabilitation ($t=3.91, p<0.001$). Superior-frontal and transverse-temporal functional connectivity with the default mode network predicted increased improvement in cognitive processing speed following rehabilitation (mean t-stat=2.37, mean p=0.04; 137 voxels). As well, increased white matter tract disruption in a network of two region-pairs (l. precuneus-l. transverse temporal, l. precuneus-l. pallidum) predicted lower treatment efficacy (p=0.038). Mean tract disruption of this network explained significant additional variance after accounting for age, sex, disease duration, lesion volume, and gray matter volume ($\Delta R^2=0.144$, p=0.024).

Conclusions: Specific patterns of functional connectivity and structural network disruption involving the default mode network and the left precuneus predict patient response to restorative cognitive rehabilitation.

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B. ENGEL YEGER. Sensory processing difficulties in Multiple Sclerosis – prevalence and impacts on functional behavior.

The central nervous system (CNS) changes in Multiple Sclerosis (MS) may affect patients' ability to process sensory input. These sensory processing difficulties (SPD) may result in hyper or hypo sensitiviy and interfer with daily function. Nevertheless, the literatrue about SPD and its functional impacts in MS is limited. This presentation aims to elaborate the knowledge about (1) SPD prevalence in patients with MS (2) The association between SPD, disease severity and daily function.

Methods: Sixty two participants with MS completed the Adolescent/Adult Sensory Profile (AASP); **The Multiple Sclerosis Functional Composite (MSFC) – to assess disease severity, and the Functional Behavior Profile** (FBP) - to measure function in daily life.

Results: According to AASP norms, patients with MS had lower sensory registration, greater sensory sensitivity and greater sensory avoidance. Lower sensory registration significantly correlated with disease severity and was the main predictor of functional behavior in daily life.

Conclusion: SPD may be prevalent in MS and affect people's daily function. Clinicians should screen for SPD among patients with MS, and understand their impacts on patients' daily function. Administering the AASP to MS patients may assist in tailoring the optimal intervention based on patients' specific needs and real life context.

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Y. GOVEROVER. The impact of symptomatic multiple sclerosis on complex everyday activities.

Patients with Multiple Sclerosis (MS) often have motor and cognitive deficits accompanied by symptoms of depression and anxiety. These deficits may impact patient performance on complex everyday activities. This presentation has two objectives: (1) to determine the functional significance of cognitive, motor, and affective deficits in persons with MS and (2) to examine whether cognitive, motor, and affective abilities can predict impaired daily function in persons with MS.

Methods: Fifty-eight participants with MS were evaluated with a performance-based assessment of everyday life activities called Actual Reality (AR). AR requires participants to use the Internet to perform three tasks: purchase (1) an airline ticket, (2) cookies, and (3) pizza. Additionally, neuropsychological tests and questionnaires were administered to assess cognitive functions, depression and anxiety.

Results: Participants who were less depressed and anxious had better cognitive and motor abilities and also performed the AR task better. Additionally, cognitive abilities were a significant predictor of AR performance above and beyond affect and motor ability.

Conclusion: Reduced accurate performance in complex everyday activities in persons with MS can be explained by a decrease in cognitive abilities. Combining neuropsychological and ecological real-world assessments in research will further our understanding of the difficulties individuals with MS face in completing complex everyday activities.

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N. JOSMAN. Integrating Virtual Reality in a Metacognitive Intervention for Training Executive Functions in People with Mild Cognitive Impairment.

There is an upward trend in the percentage of people over 65 years diagnosed with mild cognitive impairment (MCI). MCI is typically associated with a decline in executive functions (EF) and memory, which impact upon an individual's participation in a wide range of daily life activities, including shopping at a supermarket. It is therefore imperative to design interventions to improve EF and performance within real-world contexts, such as a supermarket. While it would be unfeasible to administer client training within a real supermarket, virtual reality environments, such as the Virtual Action Planning - Supermarket (VAP-S) have been designed based on a metacognitive approach for training people with MCI. This presentation will 1) Describe the VAP-S and its implementation as a training tool within a metacognitive intervention method; 2) Demonstrate and discuss results of a pilot study investigating the efficacy of the VAP-S for improving shopping task performance and EF among people with MCI.

Method: Seven participants with non-amnestic or multi-domain amnestic MCI completed the study protocol, based upon an ABA single subject design. Outcome measures included: 1) the Multiple Errands Test (MET) to assess EF and shopping skills while performing a shopping task in the real supermarket, and 2) the WebNeuro computer-based test to assess EF impairments.

Results: Four participants improved their EF as assessed by the WebNeuro and 4 improved their shopping performance on the MET.

Conclusions: These pilot results point to the potential for using the VAP-S as an intervention tool for training EF in people with MCI. Further research with RCT methodology is needed to further substantiate treatment effectiveness.

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J. TOGLIA. Metacognitive strategy based intervention for persons with Multiple Sclerosis.

Cognitive dysfunction is recognized as a core symptom of Multiple Sclerosis (MS), affecting up to 60% of patients. Since MS-related cognitive impairments can negatively affect social, emotional functioning, quality of life, and participation in a wide range of daily life activities, it is imperative that interventions are designed to improve cognitive performance within the context of everyday life. This presentation will 1) Describe the key ingredients of a metacognitive strategy based intervention to address functional cognitive deficits in MS; 2) Discuss results of pilot data on the feasibility and effectiveness of a group program designed to increase memory self-efficacy and daily functioning.

Methods: Thirteen persons with Multiple Sclerosis and self-perceived cognitive impairments participated in one of 2 groups for 2 hours each week for 10 weeks. Pre-post measures were obtained on questionnaires that assessed depression, everyday functioning, and cognitive functioning. Post intervention evaluations examined participant perceptions of utility and satisfaction with intervention components as well as self-perceived changes. The Dutch Abridge Metamemory in Adulthood Questionnaire (MIA), was the primary outcome measure.

Results: Group participants demonstrated significant changes in memory self-efficacy and depression from pre to post-evaluation. Several themes emerged from the participant's post-intervention evaluations including increased self-confidence, self-control, understanding of cognitive deficits, and ability to cope and accept their new cognitive self. Engagement within group sessions, satisfaction and acceptance was high.

Conclusion: Metacognitive strategy group intervention for persons with MS is feasible and may improve self-efficacy, mood and daily functioning.

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Symposium 9. Fatigue in Clinical Conditions: From Basic Research to Treatment

Chair and Presenter: Ekaterina Dobryakova

Discussant: John DeLuca

Presenters: Benzi Kluger, Helen Genova, Birgitta Johansson

10:15–11:45 a.m.

E. DOBRYAKOVA, J. DELUCA, B. KLUGER, H. GENOVA & B. JOHANSSON. Fatigue in Clinical Conditions: From Basic Research to Treatment.

Fatigue, defined as difficulty in initiating or sustaining voluntary mental tasks, is a common symptom in several clinical conditions, such as multiple sclerosis (MS), Parkinson's disease (PD), traumatic brain injury (TBI), and etc. Fatigue is reported to be a severe and disabling symptom that interferes with daily living. While there are various lines of work on the topic of fatigue, to date there has been no integrated accounts and no one effective treatment. The proposed symposium attempts to integrate fatigue research by focusing on underlying neurobiological mechanisms, basic research and treatment.

The current symposium constitutes a collection of multidisciplinary work from researchers from around the world and spans several clinical populations. The overall goal of the symposium is to explore behavioral and neural mechanisms of fatigue as well as pharmacological and non-pharmacological treatments. The discussant, Dr. DeLuca starts with an overview of the symposium and outlines the history of fatigue research, barriers to studying fatigue, and directions for future fatigue research. In the 1st talk of the symposium, Dr. Benzi Kluger focuses on fatigue in PD and on testable taxonomy for clinical fatigue research. In the 2nd talk, Dr. Dobryakova examines dopaminergic mechanisms associated with fatigue in individuals with TBI and MS using functional MRI. The last 2 talks address fatigue treatment. Dr. Genova presents data from a randomized clinical trial in MS on the effectiveness of a behavioral exercise intervention. Finally, Dr. Johansson talks about pharmacological fatigue treatments and presents data from a randomized clinical trial in TBI on the effectiveness of methylphenidate, a dopamine agonist medication that increases the levels of dopamine in the brain. Thus, it is anticipated that the current symposium will appeal to an interdisciplinary audience and will draw attention to the study of fatigue in clinical conditions in a more systematic manner.

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B. JOHANSSON. Long-Term Methylphenidate Treatment for Mental Fatigue After a Traumatic Brain Injury.

Objective

Long-term mental fatigue is common after a traumatic brain injury (TBI) irrespective of severity, and can have a considerable negative effect on work and quality of life. There is currently no effective treatment for long-lasting mental fatigue. The primary objective for the study was to evaluate the effects of methylphenidate (MPh) on mental fatigue, assessed with the Mental Fatigue Scale (MFS) after TBI. Cognitive function, mental health and safety were also included in the evaluation. After the primary study the participants with positive effect of MPh continued their treatment and have been carefully followed up after 6 months, two and six years.

Participants and methods

Fifty-one TBI (most mild) subjects with mental fatigue were included and 44 completed the treatment with no medication, 4 weeks, low dose MPh (up to 5mgx3), 4 weeks, and a higher dose most often used (up to 20mgx3), 4 weeks. Short-acting MPh was used. The patients were randomized into three groups where all groups were given all treatments

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in random order. Of the 44 who completed, 32 had a positive effect and continued. The follow-up six years later included all participants, both those who continued (17) and those who discontinued.

Results

From the primary study, significantly reduced mental fatigue was found, with the most prominent effects at 60 mg /day. Improvement was also found in cognitive function and mental health. These effects were stable over the long-term follow-up. No serious adverse effects were reported. Heart rate was significantly increased from baseline, but was still within a normal range. MPh did not induce any ECG changes.

Conclusions

For patients having a positive effect of MPh, it was well-tolerated over a longer treatment period of six years and the clinical effects remained without any adjustment of dose. Alleviation of mental fatigue improved quality of life, but not working capacity. MPh is suggested to be a possible option for patients with mental fatigue.

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H. GENOVA. Exercise as a Treatment for Fatigue In MS.

Objective: Cognitive fatigue is one of the most prevalent and debilitating symptoms across several medical conditions. Cognitive fatigue is cited as being a significant barrier to employment, educational attainment, and everyday functioning. Although several treatments have been suggested as potentially helpful for alleviating cognitive fatigue, there is no clear evidence that any treatment is truly beneficial. In Multiple Sclerosis (MS), recent studies have shown that exercise improves a number of symptoms, including mood, cognition, and motor fatigue. However, the impact of exercise on brain mechanisms underlying cognitive fatigue is not fully understood. One hypothesis is that exercise may induce functional changes to brain regions implicated in fatigue, such as caudate. The aim of the current study was to study the effects of progressive resistance training (PRT) on overall fatigue and resting-state functional connectivity (rsFC) of the caudate in persons with MS.

Methods: Participants were semi-randomly assigned to either a 16-week home-based PRT (n=5) or stretching control (n=5) condition. Before and after the intervention, participants underwent a fMRI scan during which rsFC was examined.

Results: Both groups demonstrated reductions in overall fatigue (main effect of time: F=.84, d=.65). Significant group × time interactions were found, with the PRT group demonstrating post-training increases in rsFC between caudate and left inferior parietal (F=66, p<.001), bilateral frontal (both p<.001), and right insula (F=21.8, p=.002) regions compared to the stretching group. Furthermore, greater post-training increases in rsFC between the caudate and left inferior parietal region were associated with greater decreases in cognitive fatigue (r=-.52) specifically.

Conclusions: This study provides initial evidence for the caudate as a potential neural substrate for the beneficial effects of progressive resistance training on fatigue in persons with MS.

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B. KLUGER. Is Fatigue a Useful Construct for Neuropsychology?

Objective: Fatigue is one of the most commonly reported and disabling symptoms across a wide range of neuropsychiatric illnesses. Despite the apparent clinical importance of this symptom, our success in understanding the mechanisms or developing therapies for fatigue has been minimal. One of the greatest barriers to scientific progress has been issues related to terminology and measurement.

Participants and Methods: We review literature from clinical and basic science to develop and describe an empirically based and testable taxonomy for clinical fatigue research. We also review examples from the study of memory, pain and depression of how taxonomy and phenomenology can provide frameworks that promote scientific progress.

Results: The proposed taxonomy is based on 5 questions: 1) Distinguishing fatigue from related phenomena (e.g. apathy, depression, sleepiness); 2) Dissociating objective performance decline from subjective symptoms; 3) Distinguishing physiologic from pathologic fatigue; 4) Describing the domains of performance affected; and 5) Defining causal factors. We will discuss examples of how this taxonomy can be used to clarify scientific questions, clinical care and communication around fatigue with a focus on our Parkinson's disease data.

Conclusion: Fatigue is a complex construct but one that is useful to neuropsychology and clinically relevant to patients. Careful use of terminology can aid progress in this field.

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E. DOBRYAKOVA. Reducing Fatigue Through Reward Presentation in Individuals with MS and TBI.

Objective: Fatigue is a common symptom in individuals with multiple sclerosis (MS) and traumatic brain injury (TBI). This debilitating symptom has been reported to greatly interfere with daily functioning, lead to reduced quality of life, and has been shown to be associated with impairment of the striatum and the ventromedial prefrontal cortex (VMPFC). These regions have been shown to be involved in affective and cognitive processes, such as effort calculation and reward processing, suggesting a possible link between cognitive fatigue and reward processes. Considering the common brain mechanisms between fatigue and reward processing, we examined whether reward presentation can lead to fatigue reduction in individuals with MS and TBI.

Participants & Methods: 23 individuals with moderate/severe TBI and 21 healthy controls (HC) participated in the study. In a separate investigation, 19 individuals with MS and 14 HCs performed the same paradigm. Specifically, while undergoing MRI, participants were presented with an opportunity to receive monetary reward during the outcome condition of the task but not during the no outcome condition. Self-reported fatigue measures were obtained after each condition and outside of the scanner.

Results: A significnat decrease in fatigue was observed after the outcome compared to the no outcome condition in both studies. Significantly greater activation was observed in the striatum in association with the outcome compared to the no outcome condition in the investigation with individuals with MS. Significantly greater activation was observed in the VMPFC in association with the outcome compared to the no outcome condition in the investigation with individuals with TBI.

Conclusions: The results suggest that reward presentation can lead to fatigue reduction in individuals with fatigue and support previous evidence of dopamine-dependent mechanisms of fatigue, highlighting the involvement of the fronto-striatal regions in MS and TBI fatigue.

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Symposium 10. Geriatric Neuropsychology: Impact of Contextual Factors on the Manifestation and Course of Illness

Chair and Presenter: Deborah Koltai

Presenters: Mark Bondi, Dan Mungas, Sarah Farias, Jennifer J. Manly

10:15–11:45 a.m.

D. KOLTAI, S. FARIAS, M. BONDI, D. MUNGAS & J.J. MANLY. Geriatric Neuropsychology: Impact of Contextual Factors on the Manifestation and Course of Illness.

In lockstep with the 2019 INS biopsychosocial theme highlighting the intersection of biological, psychological, and environmental factors impacting our work, this symposium draws on current lines of research to demonstrate how variables long considered to be covariates to control or measurement phenomena can instead be key determinants

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of outcomes. We discuss how contextual factors, such as quality of education, ethnicity, perception of risk, and compensatory strategy use directly impact the manifestation and course of geriatric neuropsychological disorders.

Presentations will highlight how the variables of perception of risk status and engagement in compensation strategies among older adults can impact memory performance, independence in functional skills, and rate of decline. Research exploring ethnoracial group differences in patterns of progression in brain structure and cognition will be presented, with consideration of potential explanatory variables. Impact and interaction of social forces such as race/ethnicity, immigration status, and educational experience, during childhood, midlife, and later life on brain structure and cognitive trajectory, and the mechanisms underlying these relationships, will be illustrated. Together, these presentations will highlight the need for a careful and sophisticated approach to understanding the manifestation and course of cognitive disorders. Such an approach necessitates attention to biopsychosocial, contextual factors in the interpretation of data and provision of clinical care, as well as consideration of their impact on research outcomes.

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M. BONDI, T.T. LINEWEAVER, D. SALMON & D.R. GALASKO. Disclosure of Alzheimer's Disease Biomarker Risks: No Lasting Adverse Impact or Unintended Adverse Consequences?

It is now possible to detect biomarkers of Alzheimer's disease (AD) in cognitively normal older adults using PET or CSF assays to detect abnormal levels of amyloid and tau proteins. These biomarkers, alone or in combination, are effective at predicting the development of AD dementia and have prompted revisions to diagnostic criteria for AD - which incorporate the presence of a biomarker as supportive evidence of the disease. These advances in biomarker development and "preclinical" AD diagnosis mean that it is more and more likely that cognitively normal older adults will be informed about whether or not they have AD pathology in their brain. Unfortunately, virtually nothing is known about the impact of receiving this information on the individual's psychological well-being, self-perception, or cognitive performance. This presentation will review studies of APOE disclosure in cognitively normal older adults to draw some lessons for future work. Initial evidence suggests that disclosure shows a transitory increase in anxiety and no lasting depression (Green et al 2012), although we have shown that disclosure has adverse consequences on subjective memory self-ratings and objective memory test performance (Lineweaver et al 2014). Specifically, those informed that they were APOE =4+ positive rated their memory worse and performed worse on objective memory tests than those who were not informed they were APOE =4+.

Our results suggest that memory may be altered to the extent that knowledge of one's APOE genotype leads them to question or to have confidence in their memory ability. This effect may be magnified in individuals who are told they possess a biomarker for AD such as a positive amyloid PET scan or adverse CSF protein levels. Because these biological risks may now be disclosed as part of the research diagnostic process, within the context of clinical trials, or via common over-the-counter genetic kits, it is imperative to determine the impacts of disclosure.

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D. MUNGAS, E. FLETCHER, B.E. GAVETT, S. FARIAS & C. DECARLI. Brain Atrophy Effects on Cognitive Decline Differ by Ethnicity and Race and are Moderated by Education.

Objective: To determine the brain variables that are most strongly related to cognitive change, identify whether these patterns differ by ethnicity and race, and understand how education moderates brain atrophy effects on cognitive decline.

Participants and Methods: 460 diverse older adults participated in a longitudinal aging study. Multilevel latent variable models regressed global cognitive slope – combining episodic and semantic memory, executive function, and spatial ability – onto covariates and MRI-derived predictor variables. Predictors included global and residualized lobar gray matter (GM) volumes and their longitudinal atrophy rates, baseline white matter hyperintensity (WMH), and baseline hippocampal volumes. Multiple groups analysis was used to test the hypothesis that patterns of change in brain structure and cognition differ by ethnoracial group. An interaction explored the hypothesis that brain atrophy effects on cognitive decline are moderated by years of education.

Results: Cognitive change was associated with global GM atrophy and specific temporal GM atrophy. Uniquely salient associations between brain structure and cognitive decline were found for global GM changes in African Americans (AA), baseline WMH for Hispanics; and baseline WMH, global GM changes, and regional temporal lobe volume changes in Caucasians. Higher education was associated with slower decline in individuals with less atrophy but with faster decline in those with greater atrophy. This moderation effect was observed in Hispanics but not in AA or Caucasians.

Conclusions: Cognitive change strongly depends on global and temporal GM atrophy. However, brain-behavior relationships differed by race and ethnicity, which may reflect varying risk factors for which ethnicity and race are proxies. Education is an indicator of cognitive reserve in individuals with low rates of brain atrophy, but the protective effect of higher education is rapidly depleted as brain degeneration progresses.

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S. FARIAS, J. GRAVANO, M. SCHMITTER-EDGECOMBE, A. WEAKLEY, D. HARVEY, K. DENNY & T. GIOVANNETTI. Compensation Strategy Use Among Older Adults: Association with Diagnostic Status, Neuropsychological Function, and Everyday Function.

BACKGROUND: Compensation strategies may contribute to greater resilience among older adults, even in the face of cognitive decline. This study sought to better understand how compensation strategy use among older adults with varying degrees of cognitive impairment impacts everyday functioning.

PARTICIPANTS AND METHODS: Participants included older adults from the University of California, Davis Alzheimer's Disease Center with a diagnosis of normal cognition, Mild Cognitive Impairment (MCI) or dementia. Participants underwent neuropsychological testing, and their informants completed questionnaires regarding their everyday functional abilities as well as how often they used various compensation strategies while completing activities of daily living.

RESULTS: As expected cognitively normal and MCI older adults had greater levels of compensation use than those with dementia. Higher levels of neuropsychological functioning were associated with more frequent compensation use. Most importantly, greater frequency of compensation strategy use was associated with higher levels of independence in everyday function, even after accounting for degree of cognitive impairment. Greater compensation is also associated with slower progression of disease.

CONCLUSION: Use of compensation strategies is associated with higher levels of functioning in daily life among older adults. Findings provide strong rational for development of interventions that directly target enhancing everyday compensatory strategies as way of helping older adults to maintain their functional independence.

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J.J. MANLY, A.M. BRICKMAN, M. GLYMOUR, A. MURCHLAND, L.B. ZAHODNE, E.R. MAYEDA, F.W. UNVERZAGT, V. WADLEY, G. HOWARD & V. HOWARD. Social Forces are Lifecourse Contextual Factors that Influence Brain Health in Aging.

OBJECTIVE

Social forces are fundamental contributors to brain health, and include race/ethnicity, immigration status, language use/bilingualism, discrimination, educational experience, geographic region, gender, and socioeconomic position.

PARTICIPANTS AND METHODS

Data are from large cohorts, including REGARDS, WHICAP, the Health and Retirement Survey, and Project Talent. Studies best positioned to contribute knowledge about social forces in brain aging are longitudinal and not clinic-based. These are community- or population-based samples that are representative or employ oversampling of disparities groups.

RESULTS

To confirm construct validity across older disparities populations, assessment of measurement invariance of neuropsychological instruments usually reveals scalar, but not metric or configural, invariance. Longitudinal models show the effect of social forces on level (intercept) of cognition and brain is greater than that on change over time (slope); however, socially disadvantaged groups have elevated incidence of impairment and Alzheimer's Disease. Early life educational, socioeconomic, and geographic factors have direct influences on later life brain health and cognition, mediated by factors such as stress and discrimination, material resources and social position, biological responses to stress, and cardiovascular disease. Examination of historical changes in social policies, secular trends, and long-term follow-up of school age cohorts provide evidence for the magnitude of causal effects of social forces on brain health.

CONCLUSIONS

Geriatric neuropsychologists can contribute to advancing research on the impact of social forces on brain health if they have validated neuropsychological instruments appropriate for use in large cohorts of diverse people in community-based settings, understand the influence of selection bias, employ longitudinal assessment, and can leverage studies that both identify and directly assess participants during early and mid-life.

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Panel Discussion Presented by the INS Student Liaison Committee: Exploring Neuropsychology as an Interdisciplinary Endeavor

Moderator: Vicki Anderson

Presenters: Erik Hessen, Lucia W. Braga, Lyn Turkstra, David Sabsevitz

10:15–11:45 a.m.

Plenary E. The Brain that Thinks About Minds

Presenter: Rebecca Saxe

11:45 a.m.–12:45 p.m.

R. SAXE. The Brain that Thinks About Minds.

Humans are the ultra-social animal, and we have a correspondingly ultra-social brain. Large swaths of human "association cortex" turn out to be preferentially active when perceiving, conceiving, or interacting with other people. In the last decade, neuroimaging research produced evidence concerning when, how much, and how selectively these regions are active. The problems for the next decade will be: What are the representations and computations supported by the populations of neurons in these regions? And how does this functional organization develop? New and emerging research from children and young adults will be presented as examples of empirical approaches to tackle these key problems both now and in the future.

As a consequence of attending this plenary, participants will achieve the following learning objectives: 1) Describe fMRI evidence of social responses in adult human cortex and 2) Explain approaches to studying social development with fMRI

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FRIDAY AFTERNOON, FEBRUARY 22, 2019

Lunch (On Own)

12:45–1:45 p.m.

Poster Session 7. Cognitive Intervention & Neurobehavioral Domains

1:45–3:00 p.m.

Cognitive Intervention/Rehabilitation

A. DON. Treating Children with Neurodevelopmental Differences: Developing and Integrating Neuropsychologically-Based Treatment with Psychotherapy.

Objective: Demonstrate the efficacy of integrating neuropsychologically-based treatment with psychotherapy for children with multifaceted neuropsychological, psychosocial, and behavioral struggles

Participants and Methods: 4 cases

1. 7-year-old with Spina Bifida with aggressive outbursts, severe anxiety impacting medical treatment, non-completion of schoolwork
2. 6-year-old with multiple diagnoses including ADHD, learning disabilities, autism, ODD
3. 6-year-old with Down syndrome, behavioral difficulties, no progress in reading
4. 8-year-old with Williams syndrome with behavioral outbursts, learning difficulties

Neuropsychologically-based treatment was developed through evaluation and qualitative analysis during treatment. Treatment developed more adaptive use of cognitive strengths and accommodated or remediated cognitive weaknesses. This work was integrated with psychotherapy and school consultation. Video examples illustrate the processes.

Results: Multiple aspects of treatment impacted progress. Sharing neuropsychological research regarding specific disorders and neuropsychological observations during therapy increased understanding for both parents and children, increased frustration tolerance and learning. Adding parent training, anxiety treatment and CBT furthered progress. Behavior and emotional difficulties in children 1 and 3 resolved and significantly lessened in the others. In combination with school

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consultation, child 1 began to take pride in completing schoolwork, child 2's behavior became manageable, and child 3 began to read. Treatment and research provided documentation to support a ruling for 800 hours of private instruction for child 4 after his treatment informed IEP was disregarded for 2 years resulting in no academic progress. Halfway through appropriate intervention, this child has made 1 1/2 years progress in reading.
Conclusions: The integration of neuropsychologically-based treatment with psychotherapy has strong potential both for children and their families and for the field of neuropsychology.
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W.A. ALVERSON & E. CRITCHFIELD. Functional Improvement Following Participation in a Community Reintegration Program for Brain Injury Rehabilitation.
Objective: Residential community reintegration programs provide an interdisciplinary and comprehensive approach to brain injury rehabilitation. Intervention is designed to maximize functional independence, enhance the ability of patients to return to productive activity, and overall improve quality of life. The Veterans Affairs (VA) Polytrauma Transitional Rehabilitation Program (PTRP) provides community reintegration to both Veterans and active duty Service Members. Research on outcomes of such programs is lacking.
Participants and Methods: Data included 138 patients admitted to the San Antonio Polytrauma Transitional Rehabilitation Program (PTRP), for comprehensive brain injury rehabilitation. Etiology of brain injury included traumatic (75.4%), stroke/aneurysm (13.0%), anoxic-hypoxic (5.1%), and other acquired non-traumatic injury (6.5%). Functioning across several domains (Abilities, Adjustment, and Participation) was assessed by clinician consensus ratings on the Mayo-Portland Adaptability Inventory-4 (MPAI-4) at admission and discharge. Mixed analysis of variance explored changes in total and subscale scores on MPAI-4.
Results: MPAI-4 total and subscale scores significantly decreased between admission and discharge ($p < .001$), indicating improvements in level of functioning. There was no main effect of etiology, however a significant interaction between etiology and time emerged ($p = .002$). Post-hoc analysis revealed that patients with anoxic-hypoxic and other non-traumatic injuries showed less improvement in physical abilities over time. Neither age nor length of stay were associated with change in MPAI-4 scores.
Conclusions: The Polytrauma Transitional Rehabilitation Program's (PTRP) community reintegration-oriented approach to brain injury rehabilitation facilitates improvements in functioning across physical, emotional/cognitive, and social/daily living domains. Functional gains are observed across various etiologies of brain injury, supporting the efficacy of community reintegration programs.
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C. BAREFOOT, L.N. PEREZ, K. MEREDITH, D. SALISBURY & C. MARQUEZ DE LA PLATA. Return to Driving Readiness and Performance on Neuropsychological Assessment in a Sample of Individuals with Brain Injury.
Objective: This study aims to determine whether a brief neuropsychological battery is associated with driving readiness following acute rehabilitation in a sample of individuals with acquired brain injury (ABI).
Participants and Methods: 30 participants, ages 18 to 77, diagnosed with ABI and receiving services at a brain injury rehabilitation program. Results from selected neuropsychological tests from a clinically-indicated battery (WAIS-IV-Block-Design, Digits-Forward, Trails-B, and Stroop-Interference) and behind-the-wheel driving outcomes (Driving-Ready: N=24; Not-Ready: N=6) were analyzed. Given the unequal sample sizes, Welch's t-tests were performed. Additionally, patients in the Not-Ready condition were analyzed using a case-series design; their results were compared to those deemed driving-ready using Z-scores.
Results: Participants in the Not-Ready condition (M= 26.67, SD= 19.531) performed worse on Trails-B than individuals in the Driving-Ready group (M= 44.38, SD=9.178)), $t(5.56) = 2.16$, p= .039. No significant differences were found for WAIS-IV-Block-Design, Digits-Forward, and Stroop-Interference. Three individuals in the Not-Ready group demonstrated significantly poorer performance on Trails-B (but no significant differences in any other measure) than patients who are Driving-Ready.
Conclusions: Consistent with previous research, Trails-B was sensitive to impairments related to driving-readiness. The results of this study suggest poor performance on Trails-B can identify some patients who are not ready to return to driving after an ABI. However, performance on Trails-B (and other measures) is not the only factor to determine readiness to drive by a rehabilitation team. A behind the wheel evaluation of driving skills is typically recommended beyond neuropsychological testing to make driving-related recommendations. Additionally, various non-cognitive factors must be considered for return-to-drive planning. Limitations, including ecological validity limitations, and strengths of the study are discussed.
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E. BERTRAND, R. NAYLOR, V. MARINHO, J. LAKS, A. SPECTOR & D.C. MOGRABI. Efficacy of the Brazilian Version of the Cognitive Stimulation Therapy in Older Adults with Dementia and Their Caregivers: a Randomized Controlled Trial.
Objective: Cognitive Stimulation Therapy (CST) is a 14 session group treatment for people with mild to moderate dementia. Substantial evidence highlights its effectiveness on enhancing cognitive functioning and improving quality of life. The present study examines the efficacy of the Brazilian version of the CST.
Participants and Methods: 53 older adults with mild to moderate dementia were randomly assigned to two groups: the intervention group participated in the CST and the active control group followed treatment as usual. The outcome measures were cognitive functioning (measured by the Alzheimer's Disease Assessment scale cognitive subscale); quality of life (Quality of life—Alzheimer's Disease scale); mood (Cornell scale for depression in dementia); functional activities in daily living (Alzheimer's Disease Cooperative Study - Activities Of Daily Living); and awareness (Assessment Scale of Psychosocial Impact of the Diagnosis of Dementia). The impact of the CST on caregivers' quality of life (Quality of life–Alzheimer's Disease scale) and burden level (Zarit Burden Interview) was also explored. Neuroimaging techniques were used to investigate predictors of response related to brain structure and function.
Results: Groups were comparable at baseline on demographic and clinical characteristics. After the intervention, significant differences were noted between groups on cognitive and non-cognitive measures. Results also showed that the CST has an impact on the caregivers perceived quality of life and burden level.
Conclusions: The findings confirm that the Cognitive Stimulation Therapy has significant efficacy on cognitive functions and perceived quality of life in older adults with dementia in the Brazilian context. Regarding that care provisions for people with dementia are still scarce in Brazil, these results are encouraging.
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S.T. CABLE, L. DREER, M. COX & A. MCBRAYER. Cognitive Functioning and Health-Related Outcomes Among Injured Service Members.

Objective: The purpose of the current study was to evaluate service member global cognitive functioning in the context of adjustment post-injury.

Participants and Methods: A total of 242 injured service members participated in this cross-sectional analysis (n = 199 males / 82.2%; n = 43 / 17.8%). The majority of the participants were Caucasian (n = 147 / 60.7%) with the average age of 37 years old (*SD* = 9.87). The average length of time since injury was 77 months (*SD* = 44.76). Service members were recruited via referral to an organized adaptive sport and recreation program for injured military and completed a battery of questionnaires over the telephone prior to attending the program. Measures assessed their global cognitive functioning (Telephone Interview for Cognitive Status: TICS), demographic variables (age, race, gender, highest level of education, months since injury, combat status, income) health behaviors (Lifestyle Profile II), depression (CES-D), post-traumatic stress (PCL), general health (General Health Survey), and community integration (Community Integration Measure). Correlational analyses were conducted between service member cognitive functioning performance and demographic and health-related outcomes. A stepwise linear regression analysis was conducted to identify predictors of cognitive functioning.

Results: Greater cognitive functioning was significantly associated with higher annual income, race (non-minority status), community integration, depression, post-traumatic stress, and aspects of health promoting behaviors. Using a stepwise linear regression to predict cognitive functioning among these significant univariate correlations, the significant predictors were posttraumatic stress scores R^2 = .18, p < .0001, predicting 18% of the variance followed by race status ($R^2\Delta$=.025,p<.0001), and health responsibility scores ($R^2\Delta$ = .26, p < .03).

Conclusions: Efficient assessment of cognitive function should be included in terms of planning rehabilitation management and treatment for injured service members.

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A.A. DESPOTI, E. KARATZANOS, D. TZOUMI, N. LEVENTAKIS, N. DIMITRIADI & S. NANAS. Cognitive rehabilitation using virtual reality: a systematic review.

Objective: Virtual Reality (VR) is an advanced technology recently used in clinical trials. Although there is data in relation to the therapeutic aspect of VR in the motor rehabilitation, there is lack of evidence regarding the neuropsychological rehabilitation. The aim of this review is to investigate the effectiveness of VR as a rehabilitation approach of cognitive functions.

Participants and Methods: A systematic literature review was conducted from 1998 to March 2018 in the electronic databases of PubMed, Cochrane, OTseeker and PsycINFO. Eleven out of 64 papers have included in the study. The research was limited in randomized controlled trials and adult patients suffering from neurological disorder or a traumatic injury.

Results: VR technologies have been used in various neurological disorders: stroke (studies=7, N=245) (ischemic or hemorrhagic), traumatic and acute brain injury (studies=3, N=102) and Parkinson's disease (study=1, N=62). Overall, the cognitive functions which have been improved are: semantic fluency (N=1), attention (N=7), short term visuospatial memory (N=1), prospective memory (N=1), verbal working memory (N=3), visuospatial memory/navigation (N=3), verbal and visual learning ability (N=2) and executive functions (N=4). One study did not reach significant improvements. Furthermore, 9 VR environments have found beneficial in improving every day skills. Only one study was ecologically valid.

Conclusions: Even though there is limited data, VR environments seem to have a positive impact in cognitive functions in the dynamic process of rehabilitation. Further research is warranted in various patients' groups to explore neuropsychological measurements and cognitive abilities potentially affected and develop more ecologically valid applications to improve patient's management and quality of daily life.

This review has been conducted as part of the "REACT" ("Virtual Reality Medical Rehabilitation") project financed by EU in the context of ESPA 2014-2020 program.

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S. DEVAUGHN, E. KORNBLITH, G. ABRAMS, J. BURCIAGA, L. POSECION & T. NOVAKOVIC-AGOPIAN. Relationship Between Perceived and Objective Change After Cognitive Rehabilitation in Veterans with Chronic TBI.

Objective: Cognitive rehabilitation of executive functioning (EF) after TBI has been associated with both improved cognition on objective measures and perceived change (PC) on self-report (Levine et al., 2000; Novakovic-Agopian et al., 2018). The objective of this study was to evaluate the relationship between PC and EF change in Veterans with history of TBI who received either executive functioning training (GOALS) or an active control brain health education training (BHE).

Participants and Methods: 26 Veterans with chronic mild-severe TBI (average time since injury=11 years) were randomly assigned to 5 weeks of GOALS or BHE training. Neuropsychological tests of complex attention and EF (Novakovic-Agopian et al., 2018) were administered pre and post-treatment. A self-report measure of PC in multiple domains of EF (Goal Processing Questionnaire-GPQ) was administered after treatment. Change in overall attention/EF composite score (AVEXE) was correlated with GPQ subscales. Regression models predicting AVEXE change with GPQ subscales were built separately for each group to determine the relationship between PC and objective change in EF.

Results: Scores on GPQ scales measuring PC in domains of *planning* (r=.409, p=.019), *self-monitoring* (n=25; r=.457, p=.011), *sequencing* (r=.435, p=.013), *attention/working memory* (r=.446, p=.011), and *learning from experience* (r=.481, p=.006) positively correlated with change in AVEXE for the whole sample. PC in *self-monitoring* explained 31% of the variance in AVEXE in the GOALS group (n = 16; F=5.8, p=.032), while PC in *learning from experience* explained 56% of the variance in the BHE group (n = 10; F=10.0, p=.0013).

Conclusions: Improvement on objective EF measure from pre to post-treatment (executive function training or active control intervention) was associated with greater PC. The relationships between objective improvement in EF and perceived change in *self-monitoring* after GOALS training, and in *learning from experience* after BHE, may reflect specific targets of each intervention.

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R. DIVERS, K. HACKETT, L. HAM, A. MATCHANOVA, C. VEGA, T. YAMAGUCHI & T. GIOVANNETTI. Virtual Reality Training of Everyday Tasks for Older Adults with Cognitive Impairment.

Objective: Practice with a virtual everyday task has been shown to improve performance of trained everyday tasks in a case report of a woman with moderate dementia. Mechanisms of improvement and the potential virtual training effects in those with mild impairment remain unknown.

Participants and Methods: Three older adults (M_{age}=75.3) with varying levels of cognitive impairment practiced an everyday task using a virtual reality (VR) paradigm. VR practice included 10 trials per day for 4 days. VR task instructions were standardized but the placement of objects in the virtual paradigm differed on each day. Differences in time to completion (TIME) and task efficiency [number of screen

interactions (INTERACTIONS)] were examined within and across VR practice trials using Reliable Change Index (RCI) scores. Participants also completed the everyday task using real objects before and after VR training, and RCI for TIME and ERRORS on the real task were examined. We hypothesized that participants would show faster times and fewer screen interactions with the VR task across training trials and better performance on the real task after VR training.
Results: All participants showed lower TIME and ERRORS on the real tasks after training, with larger RCI for ERRORS (1.12, 2.80, 2.24) versus TIME (1.85, .95, .03). TIME and INTERACTIONS during VR training were positively correlated for all participants (r's >.35, p<.01), demonstrating multidimensional improvement and no evidence for a speed-accuracy trade-off during VR training. The reductions in TIME and INTERACTIONS were markedly larger within a single training session (RCI= 2.86, 2.63, 2.92) than across the training days (RCI= .48,1.00, 1.08).
Conclusions: Virtual training of everyday tasks shows promise for reducing errors on real tasks in individuals with mild impairment. The pattern of improvement during VR training (i.e., greater improvement within a single session vs. across sessions) suggests that training benefits may be greatest immediately after training.
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A.A. DUITS, S. VAN DE WEIJER, B. BLOEM, S. KOEHLER, R.P. KESSELS & M. KUIJF. Gaming to Train Cognition in Parkinson's Disease: an Intervention for the Happy Few?
Objective: Targeting cognitive impairment in the early stages of Parkinson's Disease (PD) is important to slow down its progression to dementia. Studies on cognitive training are growing and appear modestly effective on the short term. So far, no gaming features have been used. The Parkin'Play Study aims to evaluate the feasibility and efficacy of an individually tailored home-based, online health game on cognitive performance in PD. The game targets various domains and includes online cognitive assessment to tailor the training. The focus of the present pilot study is on the feasibility of the training.
Participants and Methods: Patients with PD (n=41) and with mild cognitive impairment (MCI) were randomized to either the intervention group (IG: n=21) or the control group (CG: n=20). The intervention group performed the online game Aqua Snap for at least 12 weeks (primary phase), during which they were asked to train 3 times per week for 30 minutes. The control group was placed on a waiting list. Both groups could voluntarily train from week 12 to week 24 (secondary phase). Cognition was assessed by a standard neuropsychological assessment battery at baseline, week 12 and week 24.
Results: Sixteen IG patients (76%) started training in the primary phase and 13 patients (81%) continued playing into the secondary phase. Fifteen CG patients (75%) started training in the secondary phase. In the first 12 weeks, eight IG patients (40%) showed full adherence (e.g. > 80% of treatment plan completed). Non-adherence was mainly caused by technical difficulties. Global cognition (z-scores) showed no significant changes for both groups.
Conclusions: Over 80% of the actively playing IG participants continued the training into the secondary phase, which underlines the feasibility of our cognitive training game. Continuation of the trial is needed to add information about the benefits. Adherence is however an important condition since a continuous training is considered essential to maintain benefit over time.
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N. ESPINOSA & C.D. MARQUEZ DE LA PLATA. Maintenance of Social Participation Gains One-Year After Comprehensive Brain Injury Rehabilitation for Acquired Brain Injury.
Objective: This study aims to evaluate whether improvements in participation in social roles and activities observed during Post-Acute Brain Injury Rehabilitation (PABIR) following a brain injury can be maintained one year following discharge.
Participants and Methods: 450 patients who discharged from a PABIR facility between January 2016 and July 2017 were contacted to assess functional abilities 12 months after they discharged. Rehabilitation services were provided by Pate Rehabilitation in Dallas, Texas using a comprehensive interdisciplinary model which provides PT, OT, SLP, and neuropsychological services six hrs per day five days per week. Various social reintegration interventions were utilized during an average length of stay of 65 clinic days. The primary outcome measure used in this study to assess functional recovery is the participation subscale of the MPAI-4. A paired-sample t-test was conducted to determine change in the outcome measure from discharge to 12-month follow-up.
Results: During the sampling frame, 351 patients with CVA and 99 patients with TBI were discharged from rehabilitation. Follow-up data was obtained from 26% and 42% of these patients, respectively. Patients with CVA had mild to moderate functional limitations on the participation scale at the time of discharge, and their scores improved a modest but statistically significant amount over 12 months ($p < 0.01$). Patients with TBI also discharged from rehabilitation with a mild to moderate level of functional limitations, and at their 12-month follow-up endorsed only mild functional limitations representing a modest but statistically and clinically significant improvement over time ($p < 0.01$).
Conclusions: Comprehensive interdisciplinary PABIR appears effective in improving social participation after brain injury. Furthermore, gains made in this area of life are often maintained one year after discharge utilizing this treatment approach. Improving level of community involvement during rehabilitation, has a lasting positive effect on patients' lives.
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C.E. GARCIA-GUERRERO, X. ORTIZ & E. ARROYO. Use of Technology in Cognitive Rehabilitation in Mexico and Spain.
Objective: The incorporation of technology in the field of clinical psychology has enabled practitioners to address contemporary needs and lifestyles while taking advantage of the affordances of new developments. This study aimed to analyze the use of different digital tools in cognitive rehabilitation.
Participants and Methods: The sample consisted of 100 clinicians from Mexico (n=54) and Spain (n=46). Potential participants were contacted via professional associations and invited to answer an online survey.
Results: Most respondents were neuropsychologists (78%) and female (71%), with a mean age of 37.9 years. All clinicians reported having at least one type of technology in their professional field, mostly in cognitive rehabilitation (79%). However, the frequency of use varied, according to the country; 35% of respondents use it regularly in Mexico and 36%, always in Spain. The most commonly used technological tools were the Internet (78%) and tablets (73%). These resources served as an aid to foster the cognitive stimulation of attention / concentration (92%), memory / learning (81%) and executive functions (72%), both in the context of clinical practice (91%) and at the patients' homes (72%). Tablets were considered most efficient (74%).
Conclusions: Using technological tools has become not only a choice but a standard practice in neuropsychology. When applied to cognitive rehabilitation, these tools can complement clinicians' work, offering advantages and disadvantages that should be assessed. Studies with larger samples are required to compare the differences between clinicians' practices around the world and to evaluate the effectiveness of using technological tools in cognitive rehabilitation.

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M. HENRY, H.M. LINDSEY, G. MERCURI & G.T. VOELBEL. Perceiving is Believing: The Effect of Computerized Cognitive Remediation on Mood in Acquired Brain Injury Participants.

Objective: Computerized cognitive remediation (CCR) has been shown to be an effective treatment for specific cognitive impairments found in traumatic brain injury (TBI) populations. It is not clear if the CCR affects psychological domains such as depression and anxiety. This study examined the effects of a CCR program on measures of depression and anxiety, accounting for changes in perception of cognitive ability.

Participants and Methods: TBI (n = 48) and stroke patients (stroke n = 12) included male (n = 28) and female (n = 32) participants recruited from New York City neuropsychological and rehabilitation outpatient clinics were randomly assigned into the experimental (n = 27) or control (n = 33) condition, with ages ranging from 24 to 69 (M = 46.03, SD = 12.79). All participants underwent a neurocognitive assessment at baseline and follow-up. Participants in the experimental condition completed 40 hours of training using the Posit Science Brain Fitness Program (BFP) over the course of 12 weeks.

Results: The BFP intervention had no direct effect on depression or anxiety scores, however it did have a significant effect on the change in perception of cognitive ability (p = .045). Increases in these scores significantly predicted improved depression (p < .001) and anxiety scores (p < .001), suggesting an indirect effect of the BFP intervention on mood symptoms. Post hoc tests revealed that change in the perception of social ability subscale had a significant effect on improving depression (p < .001) and anxiety (p < .001).

Conclusions: CCR offers exciting new treatment possibilities for people living with a chronic brain injury. The implications of these results suggests that depression and anxiety may be alleviated by improved cognitive abilities. Additionally, these results indicate that CCR can benefit patients in domains not directly trained by the intervention.

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K. DENNY, O.J. HUSS, S. FARIAS, M.L. CHAN & J. GRAVANO. The Acceptability of Compensatory and Brain Health Strategies in Older Adults with Subjective Cognitive Concerns.

Objective: The purpose of this study is to determine the acceptability of a 10-week multidimensional intervention designed to promote independence and brain health in older adults with subjective cognitive concerns.

Participants and Methods: Thirty-four older adult participants (mean age: 74.08 SD: 6.59; mean education: 15.50, SD: 3.40) with normal cognition (MMSE Mean: 28.50, SD: 2.12) completed a 10-week intervention focused on compensatory and brain health strategies at the UCD Alzheimer's Disease Center. Compensatory strategies included calendar use, task lists, and organizational systems. Brain health strategies included physical exercise, stress management, and cognitively stimulating activities. After completing the intervention, participants rated usefulness and ease of implementation for each strategy on a Likert Scale from 1 to 5 (1=not at all useful, 5=very useful). Means and standard deviations were calculated for usefulness and ease of each strategy. Both quantitative and qualitative ratings were collected.

Results: Quantitative ratings of the usefulness of each strategy were positive with mean ratings of 4.51 (SD: .70) for calendar use, 4.51 (SD: .78) for task lists, 4.29 (SD: .94) for organizational systems, 4.44 (SD: .79) for physical exercise, 4.55 (SD: .62) for cognitively stimulating activities, and 4.13 (SD: .96) for stress management. Participants also rated the strategies as fairly easy to implement with mean ratings of 4.03 (SD: .89) for calendar use, 4.09 (SD: .89) for use of task lists, 3.85 (SD: 1.15) for using organizational systems, 4.12 (SD: 1.18) for physical exercise, 4.45 (SD: .56) for cognitively stimulating activities, and 3.90 (SD: .98) for stress management. Qualitative ratings were positive and identified both facilitating factors and potential barriers to activity engagement.

Conclusions: Overall, results suggest that participants in a 10-week multidimensional intervention to promote independence and brain health viewed the program as useful and easy to implement in their daily lives.

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E. KORNBLITH, J. GROBERIO & T. NOVAKOVIC-AGOPIAN. Telehealth Delivery of a Manualized Executive Function Training to Older Veterans with History of TBI: Feasibility, Acceptability, and Modifications Required.

Objective: Telehealth is a feasible, effective method of mental health service delivery, and may increase access to care for older adults. Goal-Oriented Attentional Self-Regulation (GOALS) executive function training administered in person improves cognition in Veterans and civilians with history of traumatic brain injury (TBI) and healthy older adults. This pilot study investigated feasibility and acceptability of delivering this manualized training to older TBI-exposed Veterans via home-based video telehealth (HBT).

Participants and Methods: Older Veterans (N = 2; 65+) with history of remote TBI and cognitive complaints participated in 10 group and three individual sessions conducted using Jabber videoconferencing software. Both participants carried diagnoses of tinnitus and sensorineural hearing loss. Qualitative feedback was collected throughout, and feedback questionnaires were administered post-treatment.

Results: Participants attended all 13 sessions and completed all assignments, including group and individual projects applying skills learned in training. Post-treatment, participants rated the training as highly feasible and acceptable across multiple domains: overall satisfaction (M = 4/5), ease of participation (M = 4/5), usefulness (M = 4.5/5), likelihood of using strategies (M = 5/5), and likelihood of recommending the training (M = 4.5/5).

An initial *in-person* session was useful to orient participants to HBT technology. Speech rate/register and environmental noise levels were adjusted to increase audio clarity. Future modifications based on participant feedback include use of an external microphone and changes to organization and delivery of participant materials.

Conclusions: Only minor adaptions to the existing GOALS protocol are required for HBT delivery. Our preliminary data suggest that delivering group-based executive function training to TBI-exposed older Veterans with cognitive complaints via HBT is feasible and acceptable.

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D.A. LANDINEZ & R. GONZALEZ. Working Memory Training After Stroke.

Objective: The aim of this study was to investigate the effects of Working memory training after stroke

Participants and Methods: In a randomized controlled trial, the effectiveness of a Working Memory training was studied in two groups of stroke patients. A neuropsychological test battery was administered both before and after treatment. Changes in outcomes over the intervention period were compared between both groups and a covariance analysis was performed.

Results: 34 patients were included: mean age= 61 years old [SD] = 7.1), 55.9% female, 44.1% male after stroke. 18 were assigned to the training and 16 to the control group. Improvement of digit span subtest (p= 0.019), letter-Number sequencing subtest (p= 0.04), working memory index (p= 0.008) were significantly greater in the training than in the control group.

Conclusions: WM can be improved with cognitive training after stroke. However, task difficulty level should vary adaptively during training. This is a key factor that allowed us to evaluate the effectiveness of the

training program. Our results stress the importance to include an active control condition in the study design.
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T. LIBERTA, A. SACKS-ZIMMERMAN, M. KAGIWADA, K. PERRINE & J. SPAT-LEMUS. An Investigation of Cogmed Working Memory Training (CWMT) for Neurological Surgery Patients.

Objective: The main purpose of the current study was to examine the impact of Cogmed Working Memory Training (CWMT), a 5-week, home-based, computerized cognitive rehabilitation program, for individuals who have experienced cognitive changes after neurosurgery. The objectives of the study were to examine whether specific domains of cognitive dysfunction improve following CWMT and if these improvements are maintained over time, and to determine the generalizability of the impact of CWMT to other areas of functioning, including self-report of daily functioning, mood, and quality of life.
Participants and Methods: Participants included 17 English-speaking adults between the ages of 18 and 79 who received neurosurgical intervention for various neurological disorders. Participants took a baseline neuropsychological battery prior to engaging in CWMT and follow-up sessions within two weeks of completing CWMT to evaluate any immediate changes in cognitive functioning and after three months to determine maintenance of cognitive gains.
Results: The current study produced pilot data that will support a proposal for a larger clinical study. Results indicated that participants demonstrated significant improvements on measures of basic attention, working memory, and processing speed, and decreased levels of anxiety at immediate follow-up. Significant improvements were found in working memory, verbal learning and delayed recall of a word list, and processing speed in a visual matching task at the three-month follow-up.
Conclusions: CWMT demonstrates effects on certain aspects of cognition and mood in adults with reported cognitive changes after neurosurgery. The findings warrant further investigation into the generalizability of CWMT to other areas of functioning, including other cognitive abilities and aspects of mood, daily functioning, and quality of life.
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T. NOVAKOVIC-AGOPIAN, G. ABRAMS, E. KORNBLITH, J. BURCIAGA, L. POSECION & J. MCQUAID. Long Term Outcomes of Goal-Oriented Attentional Self-Regulation Training in Veterans with PTSD and Mild TBI.

Objective: Difficulties in executive-control functions are common sequelae of both TBI and PTSD. Goal-Oriented Attentional Self-Regulation (GOALS) training was designed to target these deficits with attention regulation training applied to participant-defined goals. In previous studies both Veteran and civilian participants with chronic TBI significantly improved post GOALS, but not control training, on measures of attention/executive function, functional task performance, and emotional regulation (Novakovic-Agopian et al 2011, 2018), and on goal-directed control over neural processing on fMRI (Chen, et al 2011). The objective of this ongoing study is to examine long term effectiveness of GOALS training in Veterans with comorbid PTSD and mild TBI (mTBI)
Participants and Methods: 27 Veterans with comorbid PTSD and mTBI completed structured interview, neuropsychological and functional assessments, and self-report measures of emotional regulation 6+ months after GOALS training
Results: Relative to their baseline performance, 6+ months post GOALS training participants showed significant improvements on: 1) measures of attention/executive function (overall attention/executive function domain score, and subdomains: working memory, mental flexibility, sustained attention, inhibition and memory); 2) complex functional task performance (overall performance score, and subdomains: planning, self-monitoring, task execution, switching and maintenance of attention, and memory); and 3) emotional regulation self-report measures (PTSD symptoms on PCL-M; and depression symptoms on BDI-II). Majority of participants (96%) reported incorporating some trained strategies into their daily life
Conclusions: These preliminary results suggest that GOALS training may be promising for Veterans with comorbid PTSD and mTBI. The characteristics of participants that appeared to benefit most, as well as intervention techniques considered important in the transfer of training to participant's daily lives will be discussed
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D. O'SHEA, J.J. TANNER, M. CHANDLER, L. DE WIT, A. MEJIA, B. DEFEIS, P.A. AMOFA & G. SMITH. Prediction of Response to Behavioral Interventions with MRI-Based Hippocampal Subfields in Mild Cognitive Impairment: Preliminary Findings.

Objective: Pharmacological studies show select hippocampal subfields predict response to donepezil in mild cognitive impairment (MCI). Using hippocampal subfields to predict response to multicomponent behavioral interventions in MCI has not been investigated. The aim of the present study was to identify which baseline subfield volumes predicted improvements in cognition following a 6-month multicomponent intervention.
Participants and Methods: Data were obtained from 14 participants with amnestic MCI who completed follow-up as part of a larger ongoing study. All participants received memory compensation training, group supportive therapy (for the initial two weeks) and either cognitive training, yoga or wellness education (active control) over the full six month period. Two computerized tasks assessing visual attention and learning were administered to participants at baseline and six month follow. Raw change scores were used as the outcomes. Baseline MRI-based hippocampal subfields (i.e., CA1-4, the dentate gyrus-granule cell (GC) and molecular layer (ML) and subiculum) were extracted using FreeSurfer and adjusted for total intracranial volume. Regression analyses, adjusted for age and education, were used to test the hypothesis that larger subfield volumes at baseline would be associated with gain scores.
Results: Positive associations between improvements in visual learning and left CA4, GC and MC as well as visual attention and the right CA1, were revealed. No significant associations were revealed between whole baseline hippocampi volumes and improvements in cognition.
Conclusions: Select hippocampal subfield volumes predicted gains in cognitive performance in MCI following a multicomponent intervention that was not revealed using whole hippocampal volumes. Subfield volumetry may be a sensitive predictor of cognitive outcomes following behavioral intervention in MCI and may help identify individuals who may benefit most from interventions.
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E. RIGGALL, T. KING, G. ALVAREZ, D. MURDAUGH & K. O'TOOLE. Parent Participation in Cognitive Remediation Therapy for Children with Executive Dysfunction.

Objective: As survival among children with medical and neurological disorders increases, interventions for remediating adaptive and executive functioning (AF; EF) deficits become increasingly important. Research supports the efficacy of a cognitive remediation summer program (CRSP) for improving AF among such children. Parent's engagement in child intervention has been shown to be an important variable in promoting children's functional improvements (Farina et al., 2015). The present study assessed the relation between parent engagement and changes in AF and EF, as measured by the Adaptive

Behavior Assessment Scale (ABAS-2), Behavior Rating Inventory of Executive Function (BRIEF), and Comprehensive Executive Function Inventory (CEFI).
Participants and Methods: Participants were 32 youth (19 male; M_{age}=13.3, SD_{age}=2.5) with AF and/or EF deficits who completed CRSP, which consists of 8 biweekly individual treatment sessions between therapist, parent, and child. Parents completed the ABAS-2, BRIEF, and CEFI pre- and post-CRSP. Therapists rated parent engagement (PE; engagement in between-session check-ins). AF and EF outcomes were compared between parents rated as having high PE and parents rated as having low PE.
Results: Participants made significant pre- to post-CRSP gains in overall AF (ABAS-2, $F(2,26)=25.9$, $p<.01$) and EF (BRIEF, $F(1,26)=7.1$, $p=0.01$; CEFI, $F(1,26)=14.4$, $p<.01$). Children of parents with high PE compared to those of parents with low PE showed greater improvements in initiation of tasks (CEFI-Initiation; $F(1,29)=6.8$, $p=0.01$).
Conclusions: Overall, participants made significant gains in overall AF and EF following CRSP. High PE was linked to improvement in the child's initiation of tasks pre- to post-CRSP. Importantly, this skill is a key metacognitive construct in goal attainment and a commonly identified target for intervention identified by patients and their families. Results are promising and indicate a need to continue to track both parent and child outcomes after participation in cognitive remediation.
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M. SADEGHI, T. MCAULEY & S. SANDBERG. Examining Cogmed Outcomes in a Community Sample of ADHD Youth: Does Training Engagement Matter?
Objective: There is mixed evidence that Cogmed, a computerized WM training program, improves WM, broader executive dysfunction (EFD), and ADHD symptoms in ADHD youth. Moreover, when treatment gains do occur it is unclear whether they stem from youths' engagement with Cogmed training. This study explored cognitive and clinical outcomes following a modified course of Cogmed as well as potential individual differences where treatment gains were observed.
Participants and Methods: ADHD youth were randomized to Cogmed training (n=20, M_{age}=11.56, SD=2.30 years) or treatment-as-usual under physician care (n=18, M_{age}=11.62, SD=2.08 years). Modified Cogmed consisted of 30 sessions (3 per week x 10 weeks) with a dedicated coach at Cambridge Memorial Hospital. Assessments occurred at baseline, post-intervention (time 1), and again 3 months later (time 2).
Results: ANOVAs with group as a between-subjects factor and time as a within-subjects factor revealed no main effects or interactions for WM measures (ps>.10). For ADHD ratings, trend-level interactions reflected a reduction in the treatment group at time 2 (parent: F=3.72, p=.06; teacher: F=2.39, p=.09). For EFD ratings, significant interactions also reflected a reduction in the treatment group at time 2 (parent: F=6.40, p=.003; teacher: F=3.99, p= .03). Correlations within the treatment group revealed that parent, but not teacher, ratings of time 2 improvement were related to youths' improvement scores within Cogmed (parent: ADHD r=-.62, p=.004 ; EFD r=-.58, p=.008; teacher: ps>.10).
Conclusions: Youth who completed modified Cogmed showed deferred improvement in ADHD symptoms and executive dysfunction per report of parents and teachers. Youths' engagement with the training regimen also predicted parent perceptions of change, though not those of teachers. There may thus be some clinical benefit to Cogmed training, with youths' engagement being one of several factors to consider when trying to understand treatment gains.
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D.G. SALDANA & J. SNEED. Examining Chess Training as Cognitive Training in Children with Parent-Reported Attentional Difficulties – A Pilot Study.
Objective: Most cognitive interventions for attention-deficit hyperactivity disorder (ADHD) rely on addressing one specific cognitive domain. This is limiting due to the heterogeneous nature of deficits in ADHD. The current study examined the feasibility of implementing a 12-week chess training program in children with parent-reported attentional difficulties. We examined the impact of chess training on cognition and behavior and whether the relationship between chess training and ADHD symptomatology is mediated through the indirect effects of the relationship between chess training and relevant cognitive processes.
Participants and Methods: Twenty-four children, aged 5-12, with parent reported attentional difficulties were recruited in a 12-week chess training program that included online chess tactical puzzle practice starting at the fourth week of training. Paired samples t-tests were used to compare means of continuous clinical, neuropsychological, and chess training variables pre-post chess training. Mediation analyses were conducted to determine the indirect effects of chess training on ADHD symptom reduction, through its effects on processing speed and fluid cognition composite scores.
Results: There was significant improvement post-treatment in neuropsychological, clinical, and chess training measures. Contrary to our hypothesized mediation models, there was no evidence of an indirect effect of chess training on ADHD symptom reduction, through its effects on associated cognitive domains.
Conclusions: Chess training as a cognitive intervention is provisionally feasible for implementation with children with attentional difficulties. Our findings suggest a novel, inexpensive, and accessible approach to address cognitive and behavioral difficulties in children with attentional difficulties. Nevertheless, future research should implement more methodological rigor to rule out any expectancy biases and practice effects.
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S. SCHUBMEHL & J. CARON. CogSMART Efficacy in a Mixed Clinical Sample.
Objective: Cognitive Symptom Management and Rehabilitation Therapy (CogSMART) provides manualized training in compensatory strategies for cognitive deficits. Twamley et al. (2015) examined OEF/OIF veterans with TBI and found CogSMART and supported employment resulted in greater cognitive and functional improvement than supported employment alone. This study sought to expand on Twamley et al. by assessing CogSMART efficacy in a heterogeneous clinical sample of veterans.
Participants and Methods: Participants included 22 veterans ages 28 to 75 (M=55) with psychiatric diagnoses. Among these veterans, 27.2% had a neurodevelopmental diagnosis and 27.2% had a neurocognitive diagnosis. There were no exclusion criteria based on diagnosis, age, or service era. A within-subjects study design, using a paired-samples t-test, compared pre-treatment and post-treatment Global Executive Composite scores (GEC) from the Behavior Rating Inventory of Executive Function-Adult (BRIEF-A; Roth, Isquith, & Gioia, 2005). Further, participants were dichotomized by age (under age 60 N=13, age 60 and over N=9) to evaluate if age cohort affected the change in scores.
Results: The mean pre- and post-intervention GEC scores were significantly different, $t(21)=2.41$, p= 0.03, showing improved functioning from pre-intervention (M=73.42, SD=11.19) to post-intervention (M=67.84, SD=9.66). The amount of change was 0.5 SD (GEC t-score decreased an average of five points). The effect size for this difference was considered moderate (d=0.51). The difference in mean change between age cohorts was not significant, $t(9.16)=0.73$, $p=0.49$.
Conclusions: CogSMART has shown efficacy with OEF/OIF veterans with TBI. Results of this study expand on those findings by showing CogSMART reduced self-reported cognitive symptomatology in a mixed

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clinical sample of veterans, which suggests that this intervention is effective for adult and older adult veterans with neurodevelopmental, mild neurocognitive, and psychiatric disorders.
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S. SCIULLI, D. SOLTIS & S. BUSER. Firefighter Cognitive Performance Following a Live Burn.
Objective: Concerns about firefighters' cognitive abilities during active fire calls with current gear technology raise questions about the impact of heat retention on mental abilities. To examine this, tests that measure visuospatial abilities, working memory, attention, processing speed, short term memory and long term memory were administered. Within 30 seconds of firefighters exiting a burning building and with breathing regulators still intact, the research team began testing. A medical team also monitored heart rate and body temperature.
Participants and Methods: Six firefighters were recruited from a large urban fire department to participant in a controlled live fire burn within an enclosed structure to simulate a real world scenario. Participants completed two separate fire simulations on two occasions in which their gear varied by ability to prevent heat retention and burns. Individuals were compared against their own performance. Assessments included the Neuropsychological Assessment Battery (NAB) - Map Reading, NAB-Story Learning, Trail Making Tests (TMT), Serial 7s, the Coding and Letter-Number Sequencing subtests of the Wechsler Adult Intelligence Scale (WAIS), and the Controlled Oral Word Association Test (COWAT).
Results: Systematic behavioral and observational data suggest significant impairment in gear with higher levels of heat retention. Impairments included difficulty in maintaining eye contact and maintaining task set, as well as an increased need for repetition of directives. Pre-post analysis revealed impairments across domains, with significant deficits in visuospatial, processing speed, and verbal fluency.
Conclusions: Firefighters complete dangerous and life-threatening calls routinely at work. These results suggest that increase susceptibility to heat retention can lead to impaired cognitive functioning and decrease ability to perform rescue operations.
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S. SWAMINATHAN & G. SCHELLENBERG. Exploring the Association Between Music Training and Working Memory in Children and Adults.
Objective: There is substantial scholarly and public interest in understanding whether music lessons improve nonmusical cognitive abilities, including working memory. Most studies of music training are correlational in design and the results of true experiments are mixed. In two studies, we examined whether correlations with working memory are better explained by music training or music aptitude. With aptitude held constant, associations with music training are a better indication of training-related experience. With training held constant, associations with music aptitude suggest that the associations are due to factors pre-existing to training.
Participants and Methods: Musically trained and untrained adults (Experiment 1) and children (Experiment 2) completed tests of working memory (digit span) and music aptitude (the Musical Ear Test in Experiment 1, and the short version of the Montreal Battery of Evaluation of Musical Abilities in Experiment 2). We also collected information about participants' history of music lessons and socioeconomic status (SES).
Results: Results were consistent across Experiments 1 and 2. Both music training and music aptitude had significant simple associations with working memory. With aptitude held constant, however, music training was no longer associated with working memory. By contrast, music aptitude was associated positively with working memory even with training held constant. This response pattern persisted even with SES held constant.
Conclusions: Our results suggest that associations between working memory and the music variables we measured are more reflective of pre-existing factors than training effects. Better working memory capacity and music aptitude could be the cause rather than consequence of music training.
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D.M. UKUEBERUWA, D. THRASHER, C. YOU & R. ASARNOW. Adaptive Changes in Cognitive Skills and Psychological Symptoms with an Intensive Treatment Program.
Objective: Posttraumatic stress disorder (PTSD) and traumatic brain injury (TBI) frequently result in cognitive problems associated with everyday functional impairments. Development of new treatments is needed to enhance functioning in Veterans with these conditions. We report results of a treatment program that focused on training cognitive skills used in everyday life.
Participants and Methods: 80 OIF/OEF Veterans with history of PTSD and TBI were referred by Wounded Warrior Project to UCLA. Eligible Veterans attended a 3-week intensive outpatient treatment program (ITP), targeting PTSD, cognitive skills, and life skills. Cognitive skills training was administered individually over 12 sessions with a modified CogSMART manual. Before and after the ITP, participants rated number of days/week using certain cognitive skills on a 21-item Cognitive Training Questionnaire (CTQ) that we developed. Principal components analysis identified 5 CTQ domains accounting for a majority of variance- Calendaring, Goal Setting, Routine, Active Attention, and Medication Management (all α>.6). Participants also completed the Neurobehavioral Symptom Inventory (NSI) and Behavior Rating Inventory of Executive Function (BRIEF). Paired samples T-tests measured pre-post ITP change in cognitive skills and psychological symptoms.
Results: Participants reported increased (p<.05) use of cognitive skills in all domains, with greatest increase in Goal Setting (Cohen's d=1.4). They reported decreases (p<.05) on total NSI (Cohen's d=.9), BRIEF Behavioral Regulation Index (Cohen's d=.4) and BRIEF Metacognition Index (Cohen's d=.4).
Conclusions: ITP participants reported increased cognitive skills, decreased dysexecutive symptoms, and decreased general neurobehavioral symptoms. The greatest cognitive skill change occurred in goal setting and planning. With future data, we will examine the relation between increased use of skills and Veterans' and caregiver's ratings of everyday cognitive function.
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H. XU, D.O. CLARK, L. MOSER, J.W. TAM & F.W. UNVERZAGT. Factors Associated with Treatment Engagement in a Randomized Clinical Trial.
Objective: Examine factors associated with treatment engagement in a randomized clinical trial (RCT).
Participants and Methods: 1538 community-dwelling, adults age 65+ years were recruited for an RCT of the efficacy of cognitive and physical training on cognition, 193 were eligible (had subjective memory complaints but no dementia), and 146 were randomized to treatment. This analysis includes 124 S's who completed the intervention phase of the RCT. The 4 treatment arms are: cognitive training via Brain HQ, seated aerobic exercise, combined seated aerobic exercise followed by Brain HQ, and aging education discussion control. All interventions were delivered via internet-enabled, video-conference and led by trained facilitators using a small group format of 4-7 S's per group. Training occurred 2 to 3 times per week (depending on treatment arm)

for 12 weeks. Measurements were taken at baseline, post-treatment, and 3-month follow-up and include: demographics, health, cognitive tests, self-reported mood and everyday function, physical fitness, and APOE status. Multivariable modeling was used to identify factors associated with high treatment engagement defined as attendance at 80% or more of treatment sessions.
Results: 107 S's had high attendance and 17 had low attendance. S's who were married, more physically fit, more cognitively able, and had higher daily function tended to have better treatment attendance (all p's < .05). A multivariable model, including variables with a univariable p < 0.3 were included in a forward selection procedure with p-value for entry of 0.1, found that better AVLT delayed recall (OR 1.26 [CI 1.06-1.49], p <. 009) and higher daily function (OR 0.86 [CI 0.75-0.98], p <. 021) was associated with high training attendance.
Conclusions: Better memory and everyday functional status were associated with high treatment attendance in this lifestyle RCT for older adults with memory complaints but no dementia.
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B.P. VASQUEZ & N.D. ANDERSON. Feedback Training for Response Time Consistency Improves Attention on Task in Healthy Adults.
Objective: Response time intraindividual variability (RT IIV) from trial to trial is elevated in healthy older adults; the measure is thought to represent the fidelity of executive control mechanisms that maintain attention on task. Thus, it is of value to study the malleability of RT IIV. The current study provides a detailed examination of RT characteristics following a variability feedback training paradigm.
Participants and Methods: 121 healthy adults were recruited to satisfy three age cohorts (40 young [aged 18-30], 40 young-old [aged 65-74], and 41 old-old [aged 75-85]). Participants were assigned to feedback or no feedback (standard) conditions during a touch-screen feature integration task. In the feedback condition, participants were shown their performance on the previous block of trials and encouraged to reduce their RT IIV. Feedback effects on RT were analyzed using a measure of RT IIV (intraindividual standard deviations, ISD), ex-Gaussian distributional fitting, Vincentizing, and applying the drift diffusion model.
Results: Significant within task feedback-related reductions in RT IIV were observed in all age groups. Examination of RT distribution indices revealed that feedback led to a reduction in sporadic exceptionally slow responses, but a general increase in RTs throughout the rest of the distribution. The drift diffusion model analysis suggested that effects were due to decreasing the response boundary (all age groups) and maintaining an elevated rate of evidence accumulation, particularly in the young and old-old.
Conclusions: The findings indicate that targeting the reduction of RT IIV improves attention on task by reducing the frequency of extremely slow responses that have been linked to brief attention lapses, at the expense of overall slowing. The data provide a proof of principle that a relatively short training paradigm can be applied to improving RT characteristics, likely facilitated through the amplification of executive control processes.
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K.L. VICKERS, L.R. MILLER & M.T. SCHULTHEIS. Defining Adherence to Behavioral Recommendations After TBI.
Objective: Adherence is the extent to which one's behavior coincides with prescribed healthcare recommendations and is a mediating factor to treatment success after traumatic brain injury (TBI). Current methods of assessing treatment adherence rely on summative measures and self-report. These methods are prone to error and provide little information about the underlying mechanisms of poor adherence. The current study proposes a nuanced metric of adherence (consistency) that was found in a pilot study to relate to executive functioning performance. It was hypothesized consistency would relate to executive functioning in individuals with TBI.
Participants and Methods: 5 community-dwelling adults with a history of non-penetrating head injury (*Mage*= 55 years, 60% male) were recruited for the current study. All participants completed cognitive testing, including Trails B (*M*= 69.6 sec, *SD*= 14.9) and DKEFS Color-Word Inference, Switching Condition (*M*= 68 sec, *SD*= 12.3), before engaging in a 4-week behavioral regimen wherein 3 online cognitive activities were prescribed per day. Outcome measures included adherence (number of events completed; *M* = 72.3 events, *SD* = 13.9) and consistency in adherence (variability in timing of event completion; *M*= 84.9 min, *SD*= 40.7).
Results: Bivariate Pearson correlations revealed greater consistency in adherence was associated with better performance on Trails B, r= .99, p= .01, and on Color-Word Interference, r= .99, p<.01. Overall adherence was not related to consistency in adherence, r= .32, p= .67, or executive functioning, r= .25, p= .75.
Conclusions: Consistency is an aspect of adherence related to executive functioning abilities. Given the importance of adherence to treatment outcomes after TBI and the prevalence of executive dysfunction in this population, these findings indicate important clinical considerations post-TBI. Ongoing data collection is anticipated to further elucidate the relationship between consistency and regimen adherence.
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Executive Functions/Frontal Lobes

L.J. P. ALTMANN, B.C. ORR, T. RAFFEGEAU, A. STONE & C. HASS. Analyzing the Hopkins Verbal Learning Test (HVLT): Effects of Gender and Cognition.
Objective: Verbal learning tests like the HVLT and similar tests assess not only verbal memory and delayed recall, but also the extent to which people can create strategies based on semantic categories (Lezak et al. 2004). This study examined whether cognitive abilities other than memory may contribute to HVLT performance using stepwise regressions.
Participants and Methods: Olderr adults (N=81; 29 male; age 65-80) completed the 3 learning trials of the HVLT, the delayed recall trial 25 minutes later., and 12 other cognitive tasks. Exploratory factor analysis yielded 4 underlying factors: working memory (WM), Speed, Fluency, and Inhibition. T-tests compared performance across genders. Backward stepwise regressions investigated first trial recall (1st), the total items on the three learning trials (Total-3), and delayed recall, using age, gender, and the 4 cognitive factors as predictors.
Results: The 2 groups differed significantly only on the Speed factor; females were faster than males. Females also outscored males on all HVLT measures. Predictors of the 1st trial included gender and Fluency, total r^2=.22. Predictors of Total-3 comprised gender, Fluency, Speed, and WM, total r^2=.33. Predictors of the delay trial included gender, Speed, and WM, total r^2=.20.
Conclusions: Like Vanderploeg et al (2000), we found pervasive gender effects in the HVLT; however, in contrast to Vanderploeg et al, we found no significant effect of age. Unexpectedly, 1st trial recall was more related to Fluency than Memory. Total-3 scores again showed significant effects of gender and Fluency, with small, significant contributions from Speed and WM, which may reflect use of strategies. After the delay, the effects of Fluency faded, and performance depended on processing speed and WM. Thus, cognitive abilities contribute differently to HVLT performance at each stage of the test.
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S. BABAD, A. ZWILLING, K.W. CARSON & V. NIKULINA. Are Adverse Experiences in Childhood Associated with Risk-Taking and Sensation Seeking in Emerging Adulthood?

Objective: Risk-taking and sensation-seeking are related, yet distinct traits, in part mediated by the prefrontal cortex (PFC). These constructs predict health risk behaviors (HRBs, e.g., risky sexual practices) and are risk factors for poor life outcomes. Adverse childhood experiences (ACEs) are associated with HRBs. However, the individual and cumulative relationship between ACEs (e.g., child maltreatment, surviving natural disaster, incarcerated parent) and risk-taking and sensation-seeking has not yet been explored in emerging adulthood (ages 18-25), a developmental period of increased risk-taking and sensation seeking. The current study fills this gap.

Participants and Methods: Undergraduates (M = 19.70) participated in an online study conducted at a diverse, public university (N = 436; 67% female; 22% Hispanic; 33% Asian). ACEs, risk-taking, and sensation-seeking were measured using the ACE Survey, Domain-Specific Risk-Taking Scale, and the Behavior Inhibition/ Approach Scales, respectively. Hierarchical linear regressions were run with subscales of risk-taking/sensation-seeking as outcomes and individual and cumulative ACEs (assessed by the number of ACEs experienced) as predictors.

Results: Several individual ACEs predicted risk-taking and sensation-seeking behaviors. Specifically, history of physical neglect was associated with increased financial and ethical risk-taking and decreased pursuit of desired goals. History of emotional abuse predicted greater withdrawal from goal directed behaviors, history of emotional neglect predicted lower reward-seeking tendencies, and history of substance using caregiver predicted decreased pursuit of goals. No cumulative associations of ACEs with outcomes were observed.

Conclusions: Individual, but not cumulative, ACEs predict risk-taking and sensation-seeking constructs. These findings suggest that ACEs can help explain individual differences in traits linked to HRBs and negative life outcomes and may help to understand differences in PFC development in emerging adults.

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K. BORESS, A. CWIEK, R. SKEEL & A. MAFFETT. Impact of Executive Functions on Relational Aggression.

Objective: This study investigated factors related to relational aggression in an adult sample. There were six hypotheses: (1) There would be a negative relationship between working memory and impulsivity; (2) a positive relationship between physical aggression and impulsivity; (3) a negative relationship between working memory and physical aggression; (4) a positive relationship between working memory and relational aggression; (5) a positive relationship between victimization and engagement in relational aggression; (6) and working memory would moderate the relationship between victimization and relational aggression

Participants and Methods: Participants were recruited from psychology classes at a large Midwestern University. Data analysis was completed with 84 participants (77% were Caucasian, 73% were female, mean age = 20.4, SD=3.08). Impulsivity was measured using the Barratt Impulsiveness Scale and the Immediate Memory Task. Working memory was measured using the Digit Span Task and the n-back Task. Relational aggression/victimization and physical aggression were assessed through the Self-Report of Aggression and Social Behavior Measure.

Results: The results revealed a negative relationship between working memory and relational aggression (r = -.27, p= .01). Regression analysis found an interaction effect for relational victimization and working memory on relational aggression R^2 = .44, F (3,80) = 20.61, p= .00, f^2=.79, with the interaction term accounting for 13% over relational victimization and working memory, ΔR^2= .13, ΔF (1, 80) = 19.07, p = .00, f^2=.15. Further inspection revealed that working memory moderated the relationship between relational victimization and relational aggression. High levels of working memory ability reduced the impact of having been a victim of relational aggression on engagement in relational aggression.

Conclusions: This study has the potential to improve understanding of factors related to relational aggression that may assist in the development of interventions.

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J. BURGESS, J. BURGESS & C. GOLDEN. Distinguishing Performance on Tests of Executive Functions Between Those with Depression and Anxiety.

Objective: To see if there are differences in executive functions between those diagnosed with Major Depressive Disorder (MDD) and those with Generalized Anxiety Disorder (GAD).

Participants and Methods: The data were chosen from a de-identified database at a neuropsychological clinic in South Florida. The sample used was adults diagnosed with MDD (n=75) and GAD (n=71) and who had taken the Halstead Category Test, Trail Making Test, Stroop Test, and the Wisconsin Card Sorting Test. Age (M=32.97, SD=11.75), gender (56.7% female), and race (52.7% White) did not differ between groups. IQ did not differ but education did (MDD=13.41 years, SD=2.45; GAD=15.11 years, SD=2.40), so it was ran as a covariate in the analyses. Six ANCOVAs were run separately with diagnosis being held as the fixed factor and executive function test scores held as dependent variables.

Results: The MDD group only performed worse on the Category Test than the GAD group ([1,132]=4.022, p< .05). Even though both WCST scores used were significantly different between the two groups, both analyses failed Levene's test of Equality of Error Variances, so the data were not interpreted.

Conclusions: Due to previous findings that those diagnosed with MDD perform worse on tests of executive function than normal controls (Veiel, 1997), this study wanted to compare executive function performance between those diagnosed with MDD and those with another common psychological disorder. The fact that these two groups only differed on the Category Test shows that there may not be much of a difference in executive function deficits between those with MDD and GAD. That being said, not being able to interpret the scores on the WCST test due to a lack of homogeneity of variance indicates that a larger sample size is needed to compare these two types of patients, as significant differences may be found. The results of this specific study, however, could mean that the Category Test could be used in assisting the diagnosis of a MDD patient.

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L. BUSTEED, C. GARCÍA-SÁNCHEZ, B. PASCUAL-SEDANO & M. MOLINS-SAURI. Performance of Alternating Verbal Fluency in Three Parkinson's Disease Conditions: Stable, Fluctuating, and with Bilateral Subthalamic Deep Brain Stimulation.

Objective: To study the performance of alternating verbal fluency in three different PD groups: stable, with fluctuations, and patients surgically intervened with bilateral deep brain stimulation of the subthalamic nucleus (DBS), using a control group for comparisons.

Participants and Methods: 55 non-demented PD patients in the ON condition (18 stable, 18 fluctuating, 19 DBS) were evaluated with an alternating verbal fluency task. 72 participants were evaluated for the alternating verbal fluency control group. The battery of tests included the Parkinson's Disease Dementia-Short Screen (PDD-SS) and the Mini-mental State Examination (MMSE).

Results: Patient groups were comparable in terms of age (stable: 69.11 + 12.3 / fluctuating: 61.78 + 8.45 / DBS: 63.84 + 6.05 / control: 66.44 + 9.25) and education level (stable: 1.61 + .916 / fluctuating: 1.72 + .895 / DBS: 1.58 + .769). Statistical results demonstrated uniformity among groups regarding education level (p = 1.000) and age (p = 1.000).

All patients were cognitively normal. Parkinson's Disease pacients were evaluated with the PDD-SS and the control group was assessed with the MMSE. Cognitively deteriorated patients were eliminated from the study.

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Performance of alternating fluency in all PD conditions was lower than the control group except for fluctuating (stable: 11.39 + 3.38 / fluctuating: 12.67 + 4.7 / DBS: 9.53 + 3.67 / control: 12.44 + 3.13) and was significant between the fluctuating and DBS group (p = .044) and the DBS and control group (p = .010).
Conclusions: These results demonstrate a worse performance of alternating verbal fluency in patients with PD when compared to a control group. This is due to the impaired frontal functioning in PD patients which affects verbal fluency, and the alternating fluency paradigm increases cognitive demands (shifting capability). The worst performers were the DBS group, indicating length of disease progression affects alternating verbal fluency.
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K.M. FRODSHAM, N.R. RANDALL, K.A. CARBINE, R.E. RODEBACK, J.D. LECHEMINANT & M.J. LARSON. Does Type of Active Workstation Matter? Comparing Cognitive and Typing Performance Between Rest, Cycling, and Treadmill Active Workstations.
Objective: Current research suggests that active workstations are associated with improved health outcomes, but the effects of active workstations on cognitive performance and typing outcomes are mixed. We used a seated baseline testing session and an active follow-up session to address two main questions: (1) Are there differences in cognitive and typing performance between a seated and active workstation (treadmill and cycling combined) ? (2) Are there differences in cognitive and typing performance between cycling and treadmill workstations?
Participants and Methods: The study included 102 young adults (56 females, mean age = 20.7; *SD* = 1.9). All participants completed cognitive and typing tests while sitting (session one) to establish baseline scores: Rey Auditory Verbal Learning Test (AVLT), Paced Auditory Serial Addition Test (PASAT), a typing test (net speed, gross speed, accuracy), and a Flanker task. Participants were then randomized to a treadmill or cycling desk group (session two), during which they performed the tests listed above in a counterbalanced fashion, using alternate versions when available.
Results: There was a difference between seated and active sessions for all cognitive tests: PASAT and Flanker scores were better during the active session, but AVLT scores were worse during the active session (ps < .05). Participants performed better at the active session on net and gross typing speed; however, there was no difference in typing accuracy between sessions. There were no significant differences (ps > .05) between cycling or treadmill workstations on cognitive or typing outcomes.
Conclusions: Active workstations may be viable options in desk jobs as they are related to better health outcomes and do not seem to largely impair abilities such as attention, cognitive control, or typing, although in the current study they are related to worse verbal memory scores. No major differences were seen between treadmill and cycling active workstations.
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L.M. FRUEHAUF, J.E. FAIR, S.W. LIEBEL, D. BJORNN & M.J. LARSON. An Assessment of Context Maintenance in Obsessive-Compulsive Disorder.
Objective: Cognitive difficulties associated with obsessive-compulsive disorder (OCD) may be associated with alterations in the cognitive control process of context maintenance—the internal representation and utilization of task-relevant information to accomplish task goals. We tested context maintenance in people with OCD compared to healthy controls using two tasks aimed at elucidating context maintenance: a) the cued-Stroop, a single-trial version of Golden's Stroop test that randomly varies the instructions for each trial (color-naming or word-reading), and b) the AX-CPT task, a continuous performance task wherein participants use task context to respond to an "A" only when followed by an "X."
Participants and Methods: Participants with OCD (*n*=31) and healthy controls (*n*=30) completed neuropsychological measures, self-report questionnaires, and two computerized tasks: the cued-Stroop and the AX-CPT. The delay between the cue and probe for each task was varied so context was maintained over 1s or 5s delay. We conducted a 2 (Group) x 2 (Delay) x 3 (Condition) repeated measures (RM) ANOVA for the cued-Stroop and a 2 (Group) x 2 (Delay) x 4 (Condition) RM ANOVA for the AX-CPT. Median reaction times (RT) and mean error rates (ER) were the dependent variables.
Results: For the cued-Stroop task, there were no significant differences in RT or ER between groups for delay or condition (*p*s > .45). Similarly, for the AX-CPT, there were no significant differences in RT or ER between groups for delay or condition (*p*s > .11).
Conclusions: In this sample, participants with OCD did not demonstrate deficits in context maintenance across multiple tasks. Limitations include having only mild to moderate severity of OCD as well as comorbid depression and anxiety within the OCD group.
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T. AZUMA, K. GALLAGHER, X. LUO & F. GALLUN. The Effects of Anxiety on Auditory and Visual Working Memory in Military Veterans.
Objective: Self-reported anxiety rates are high among military veterans following deployment (Seal et al., 2010). The cognitive consequences of high anxiety levels in veterans have not been widely studied, although adverse effects of anxiety on higher-order cognitive processes, including executive function, have been reported in civilians (Ursache & Raver, 2014). The current study was designed to examine: 1) the effect of anxiety on complex and simple working memory tasks in veterans and 2) how presentation modality and cuing effects interact with anxiety effects.
Participants and Methods: 35 military veteran participants recruited from Arizona State University provided informed consent and completed a questionnaire with demographic and medical history questions and the Beck Anxiety Inventory (BAI; Beck et al., 1988). Veterans were grouped into High Anxiety (BAI > 17; N=21) and Low Anxiety (BAI <17; N=14) groups. Participants completed a complex working memory task (SymSpan; Kane et al., 2004), visual and auditory span tasks, and a visual/auditory span task with cued and uncued conditions.
Results: The High Anxiety group performed significantly lower than the Low Anxiety group on SymSpan (t(30)=2.25), the visual span task (t(33)=2.39), the cued auditory span task (t(33)=3.05), and the cued and uncued visual span task (t(33)=3.20 and t(33)=2.42) (all p's<.05). The groups did not differ in simple auditory span or the uncued auditory span condition. All patterns were still observed after accounting for the effects of brain injury and depression.
Conclusions: Overall, veterans with higher levels of anxiety showed deficient working memory performance relative to veterans with lower anxiety in both complex and simple working memory tasks. The group effect varied across presentation modality with visual tasks seemingly more sensitive to the effects of anxiety than auditory tasks. The results show that veterans with higher anxiety demonstrate lower working memory performance, particularly for visual stimuli.
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M.A. GOMEZ, B.N. MEFFERT, E.L. LUCAS, M. MOSICH, D. SAWICKI, M. CLOITRE & A.J. HEINZ. A Dimensional Perspective of Adverse Childhood Experiences: Childhood Exposure to Threat and Deprivation and Adult Neurocognitive Characteristics among US Military Veterans.

Objective: Exposure to adverse childhood experiences (ACEs) is associated with negative health consequences. Recent research indicates that specific types of ACEs (i.e., threat, deprivation) may be associated with different patterns of consequences. The current study identified distinct pathways that ACEs impact adult cognitive and psychosocial functioning.

Participants and Methods: Sixty-eight military veterans with alcohol use disorder (AUD) and posttraumatic stress disorder (PTSD) completed measures of ACEs (ACE Questionnaire), psychosocial functioning (Inventory of Psychosocial Functioning), and neuropsychological measures of verbal learning and memory (Hopkins Verbal Learning Test) and cognitive flexibility (Wisconsin Card Sorting Test). Nine hierarchial regression models were conducted to determine relations between threat, deprivation, and total ACEs with functioning outcomes, after controlling for age, gender, education, and symptoms of PTSD and AUD.

Results: Higher levels of deprivation were associated with lower self-care functioning, while threat and total ACEs were not. Higher levels of threat and total ACEs were associated with lower verbal learning and memory, while deprivation was not. Higher levels of deprivation and total ACEs were associated with lower cognitive flexibility, but threat was not.

Conclusions: Results demonstrate that dimensional profiling of ACEs are associated with different patterns of cognitive and psychosocial functioning. This approach may help identify potential mechanisms for how childhood experiences of threat and deprivation influence later functioning. Further research outlining these neurodevelopmental pathways can inform interventions to reduce chronic functional impairment in this vulnerable and high-risk population.

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H. HENNRICK & C. FREEDMAN-DOAN. Temporal Impact of Childhood Stress on Executive Functioning: Resiliency Over Time.

Objective: IQ is related to Executive Functioning (EF), yet these constructs are distinct. EF refers to a plethora of higher-order cognitive processes including formulating goals, planning, execution of goal-directed plans, and effective performance. The cortical structures that primarily support EF interconnect with regions associated with emotionality and stress response. Therefore, at high levels of emotional arousal, EF will likely be impacted. The present analyses examined the impact of stress on EF, above those predicted by IQ.

Participants and Methods: The sample consisted of 90 children, aged 8- to 12-years (M=10.44, SD=1.44). 53.3% were male. 89.9% were right handed. 67.4% identified as White, 19.1% identified as Black/African American, 11.2% identified as multi-racial, and 2.2% identified as other. IQ was measured using the WASI-II, EF was measured by the Trail Making Test, Number-Letter Switching (D-KEFS), and stressful life events were assessed using the Coddington Life Events Scales (CLES).

Results: Regression analyses show that IQ was a significant predictor of EF. Hierarchical regression analyses show that recent stressful life events accounted for significantly more variance in children's EF (R^2 change = .05, $p < .05$) than IQ alone. Both IQ ($\beta = .47$, $t(87) = 3.87$, $p < .01$), and recent stressful events ($\beta = -.23$, $t(87) = -2.35$, $p < .05$) were significant predictors. In contrast, distal stressful life events (occurring 6, 9, and 12 months prior) were not significant predictors of EF.

Conclusions: Children's performance on measures of EF is impacted by recent stressful life events; distal stressors were non-significant predictors. Clinicians interpreting performance-based measures of EF should be mindful of the impact of recent stressors; a child's stress response may present as an executive deficit (e.g., disinhibition, poor cognitive flexibility), such as those seen in ADHD.

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S.K. HENRY, M. GOWEY, W. NEUMEIER, J. PHILLIPS & G. DUTTON. An Examination of the Relationship Between Frustration Tolerance and Objective Executive Function Performance in a Weight Loss Sample.

Objective: Frustration tolerance is thought to underlie neuropsychological test performance, particularly on higher-order cognitive tasks. Consequently, poor frustration tolerance is often implicated in cases of poor test performance, discontinuation, and error. The present study investigated the potential relevance of frustration tolerance to objective executive function performance.

Participants and Methods: Participants included 91 adults who previously completed behavioral weight loss treatment. The Frustration Discomfort Scale (FDS) was administered as a measure of subjective frustration tolerance. Planning and problem-solving ability, aspects of executive function, were assessed using the DKEFS Tower Test. Word-reading ability as captured by the Wechsler Test of Adult Reading (WTAR) was used as a proxy for education quality. Exploratory correlation analysis and hierarchical linear regression were conducted to identify significant relationships between frustration tolerance and executive function measures.

Results: The majority of participants were overweight or obese (mean BMI=33.5 kg/m2). The sample was racially balanced (50.5% African American, 49.5% Caucasian). FDS scores were not significantly associated with overall DKEFS Towers achievement scores but were significantly negatively associated with DKEFS Towers Test rule violations-per-item-ratio scores such that poorer frustration tolerance was associated with greater rule violation ratios ($r = -0.31$, $p<0.01$). Hierarchical linear regression modeling showed that the relationship between frustration tolerance and rule-violation-per-item ratios remained significant (DKEFS Tower: b=-.02, SE=.01, $p < 0.05$) after accounting for scores on the GAD-7, PHQ-8, and WTAR.

Conclusions: This study offers a novel investigation of the association between perceived frustration tolerance and objective executive function performance. The potential implications of the present study suggest that poor frustration tolerance is an obstacle to efficient problem solving abilities.

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S.N. HOFFMAN, M.S. HERBERT, L. CROCKER, N. DEFORD, A.V. KELLER, S.M. JURICK, M. SANDERSON-CIMINO & A.J. JAK. Pain Catastrophizing is Related to Worse Executive Functioning in Combat Veterans.

Objective: Pain catastrophizing (PC) is the exaggerated negative appraisal of actual or anticipated pain and has been associated with several adverse clinical outcomes, including cognitive deficits. We previously showed that PC was associated with worse executive functioning (EF) in combat Veterans with history of mild traumatic brain injury (mTBI). The current study extends these findings by examining whether the relationship between PC and EF differs in combat Veterans with mTBI only, PTSD only, comorbid mTBI and PTSD, and controls.

Participants and Methods: A total of 73 combat Veterans underwent neuropsychological testing and completed measures of PC, pain intensity, and depression symptoms. Participants were split into one of four groups based on a structured neuropsychiatric interview: mTBI only, PTSD only, comorbid mTBI and PTSD, and combat controls. Individual EF measures were converted to z-scores and averaged to

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create a composite. One-way ANOVAs were used to assess for group differences in PC and EF. Linear regression was used to determine if the relationship between PC and EF differed by group, while controlling for years of education, pain intensity, and depression symptoms.
Results: Groups differed on PC ($F(3,69)=8.85$, $p<.001$), such that the comorbid group had higher PC scores compared to the mTBI ($p=.005$) and control ($p<.001$) groups. The PTSD group had significantly higher PC scores relative to the control group ($p=.023$). None of the groups significantly differed on EF. Further, there was a significant main effect of PC on EF scores ($B = -.021$; $p = .016$), but a non-significant group by PC interaction.
Conclusions: Although groups differed on PC and PC was negatively associated with EF, group membership did not moderate the relationship between PC and EF. Interventions aimed at reducing high levels of PC in combat Veterans may also improve EF, regardless of mTBI/PTSD status.
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A.M. HORTON & C. REYNOLDS. Neuropsychological and Intellectual Correlates of a Short-Form Test of Executive Functioning.
Objective: This poster examines neuropsychological and intellectual correlates of a short-form test of executive functioning
Participants and Methods: Participants and Method: Twenty-eight adult patients referred by neurologists and psychiatrists for outpatient neuropsychological evaluation at a private practice office were administered full neuropsychological batteries that included the Test of Verbal and Conceptual Fluency (TVCF), the Alternate Impairment Index (AII) (a measure of neuropsychological impairment composed of subjects of the Halstead Reitan Neuropsychological Test Battery and the Reynolds Individual Intelligence Scale, Second Edition (RIAS-2). The TVCF Classification subtest involves learning to sort cards to unknown abstract categories over 116 trials. The short-form uses only 58 trials and scores are prorated. Short-form subtests are Number Correct (NC-S), Perseverative Errors (PE-S) and Category Number (CN-S)The patients included 14 females, 27 Caucasians and 1 African-American. 27 patients were right handed. Diagnoses include Traumatic Brain injury-11, Stroke-8, Brain Tumor-3, Anoxic Brain Damage-3 Epilepsy-1 Multiple Sclerosis-1 and Frontotemporal Dementia -1. Ages ranged from 30-75 (Mean-53.3, Standard Deviation-12.9) and education ranged from 12-20 years (Mean-16.6, Standard Deviation-2.1). All subjects had signed informed consent documents and passed both the WMT and TOMM. The short-form subtests of NC-S, PE-S and CN-S were correlated the AII and the Composite Intelligence Index (CIX) from the RIAS-2.
Results: Results: The correlation between CN-S and AII (.42) was statistically significant at the P<.05 level. All other correlations were nonsignificant.
Conclusions: Conclusions: Correlation between the CN-S and AII indicates the CN-S is associated with the level of neuropsychological impairment but not the level of intelligence. These findings provide further support that executive functioning and intelligence are different neuropsychological constructs.
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R.S. HUBER, M. LEGARRETA, R. HODGSON, E. MCGLADE & D. YURGELUN-TODD. Verbal Learning Deficits in Veterans with a History of Suicide Behavior.
Objective: There is a critical need to identify risk factors for suicide in veterans, as more than 20 veterans and military personnel are reported to die by suicide every day. Neurocognitive impairments in attention, executive function, and memory have been linked to suicide risk. Verbal learning involves both attention and memory and has been shown to be predictive of social and occupational functioning and treatment outcomes. Few studies have examined the association between verbal learning and suicide. The purpose of this study was to evaluate the relationship between verbal learning and suicide behavior in a veteran population.
Participants and Methods: Seventy-seven veterans, ages 18-65, completed the Columbia Suicide Severity Rating Scale (CSSRS) to assess lifetime suicide ideation and attempts. Twenty-two participants reported a history of suicide attempts, 28 reported a history of suicidal ideation, and 27 reported no history of suicide behavior. All participants completed the California Verbal Learning Test-Second Edition (CVLT-II) to assess verbal learning and memory.
Results: Controlling for age and sex, veterans with a lifetime history of suicide behavior (ideation or attempts) learned significantly fewer words over 5 trials than those without history of suicide behavior, $F(4, 72) = 3.92$, $p = .024$. Additionally, veterans with a lifetime history of suicide behavior recalled fewer words on the first trial of the CVLT-II than veterans without a history of suicidal ideation or attempt, $F(4, 72) = 5.60$, $p = .006$.
Conclusions: To our knowledge, this is the first study to examine the relationship between learning and suicide behavior in veterans. These findings indicate that veterans with a lifetime history of suicide ideation or attempts have deficits in attention span and verbal memory encoding. These cognitive deficits may have important implications for interventions to improve functional outcomes and suicide prevention in veterans.
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M.T. KASSEL, C.J. ZOLLIECOFFER & D.C. OSMON. Construct Validity of the Conner's CPT Factors: Mental Speed, Working Memory and Inhibition.
Objective: Construct validity of the Conner's CPT-2 factors was evaluated using mental speed and executive function measures. Methodological improvements included utilizing generalized regression with oracle properties and ex-Gaussian parameters that represent the entire reaction time (RT) distribution.
Participants and Methods: Thirty-five college students referred for learning problems completed a one-day neuropsychological battery that included among other tests the Conner's CPT-2, Simple RT, 2-Choice RT, Cognitive Control RT, Stroop RT, Flanker RT, 2-Back-Correct, Stop Signal Delay RT, Keep Track-Correct, and Attentional Blink- 2nd response on Lag 3 measures. CPT variables were exploratory factor analyzed and subsequently related to ex-Gaussian parameters of RT from the additional tasks in a series of generalized regressions.
Results: Four Conner's CPT-2 factors were revealed. Each factor had a unique profile of predictors from the experimental RT tasks (Generalized R^2s= .65-.84; $p<.0001$) and was associated with multiple predictors, at least one of which reflected RT variability. The CPT-Impulsivity factor was also associated with working memory and selective attention while the CPT-Inattention factor was associated with susceptibility to distraction. The two CPT-Variability factors were associated with different kinds of inhibition difficulty. An attentional blink task was not an important predictor for any CPT factor.
Conclusions: Present results demonstrate that using generalized regression techniques helps demonstrate predictive relationships with the CPT variables when using high dimension/small sample designs with predictors that have non-normal distributions. Significant results with theoretically interesting relationships were found using such analytic techniques and RT parameters that reflect the entire RT distribution.
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L.A. KATZ, A. GARAGOZZO, D. SMITH, S. HUNTER, L. KHEIRANDISH-GOZAL & D. GOZAL. Effect of Sleep-Disordered Breathing on Parent-Rated Executive Functioning in Young Children.

Objective: Neurocognitive and behavioral deficits have been reported in young children with sleep-disordered breathing (SDB). Previous research has demonstrated that problems are present regardless of SDB severity, with much of the difference in behavior and psychiatric problems occurring at the lower end of SDB pathology (Smith, et al., 2016). In comparison, cognitive challenges tend to be greatest among the highest SDB pathology group (Hunter et al., 2016). The purpose of this study was to examine parent-rated executive functioning in young children with differing presentations of SDB. Similar to other behavioral difficulties that have been documented in this population, we hypothesized that children anywhere on the SDB spectrum would demonstrate greater impairment across the domains of inhibitory control, working memory, and emotional control when compared with those without SDB.

Participants and Methods: Four hundred and ninety-eight participants (456 with SDB, 42 control; 46% female; 36% Black) from a community sample of children who snore, between the ages of four and ten years, were included in this study. The Apnea-Hypopnia Index (AHI), parental reports of snoring, and the parent report version of the Behavior Rating Inventory of Executive Function (BRIEF) were used to assess SDB and executive functioning.

Results: When comparing children with and without SDB, significant differences emerged on domains of inhibition (p = .02) and working memory (p = .01), but not emotional control (p = .40), with those experiencing SDB reporting greater executive functioning problems in these domains.

Conclusions: The findings of this study suggest that the presence of SDB may impact executive functioning in this population, even at the lowest end of the SDB spectrum. This highlights the need for identification and intervention for children who present with symptoms of SDB, not only obstructive sleep apnea (OSA), given the importance of EF skills for academic, adaptive, and social success developmentally.

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J.S. KING. Sad Mood and Response Inhibition.

Objective: Affect-as-information models hold that sad mood encourages detailed and analytical processing styles, thereby improving cognitive abilities. In contrast, resource allocation models predict that sad mood harms cognitive abilities due to sad thoughts taxing limited cognitive resources. Further, one's emotion regulation ability may affect the degree to which emotional states influence behavior or cognition. The few studies examining the link between RI and sad mood are mixed in outcome. Understanding how these variables interact will shed light on psychiatric problems that involve deficits in these areas and inform our ability to measure RI accurately. Hypotheses predicted that sad mood self-reports would increase or decrease RI and that poor emotion regulation would increase the sad mood-RI association.

Participants and Methods: Participants were 273 psychology undergraduates. About half of participants went through a neutral induction where they wrote about a typical day, and the others went through a sad mood induction where they wrote about a sad event from their life. Mood was measured with multiple single-item dimensional self-reports throughout the study, emotion regulation was measured with a questionnaire, and an RI composite score of three computerized tasks (Stroop Color-Word, Stop Signal Task, and Go/No-go) was calculated using Principal Components Analysis.

Results: Hypotheses were not supported, but though self-reports of sad mood did not affect RI, being in the sad mood condition worsened RI. In other words, writing about sad events predicted RI, but simply feeling sad did not.

Conclusions: Writing about sad events may have reduced RI because participants were distracted by sad thoughts. This is consistent with literature suggesting that cognitive loads, rumination, and mind-wandering are detrimental to cognitive functioning. Further, it extends these findings from well-established areas such as working memory to the less-established area of response inhibition.

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C.B. KOHEN, L.H. GLASSMAN, S.L. HURTADO, C. SIMON-ARNDT & C.J. THOMSEN. Psychological Correlates of Neurocognitive Functioning in a Sample of U.S. Navy Sailors.

Objective: The relationship between mental health symptomatology and cognitive deficits has been relatively well established in civilian and clinical populations. More specifically, posttraumatic stress disorder (PTSD), depression, and anxiety symptoms are associated with a number of neurocognitive deficits. However, few studies have investigated the relationship between mental health symptoms and neurocognition in a sample of active duty service members. The objective of this study was to examine the relationship between symptoms of PTSD, depression, and anxiety and cognitive performance in domains important to the mission success of a Navy ship.

Participants and Methods: Sailors (N=85) preparing for shipboard deployment completed a computerized, self-administered, neuropsychological battery that assessed attention, planning, decision-making, and information processing. Participants also provided self-reports of depression, anxiety, and PTSD symptoms.

Results: Most sailors in our sample reported non-clinical levels of mental health symptoms, with 94%, 87%, and 79% scoring below clinical cutoffs for PTSD, depression, and anxiety, respectively. In simple regression analyses, PTSD symptom severity was negatively associated with planning ($B(SE) = -.19(.07)$, $p<.001$) and information processing ($B(SE) = -.32(.12)$, $p<.01$), but not significantly predictive of attention or decision-making ($ps>.48$). Depression and anxiety symptoms did not significantly predict performance in any of the neurocognitive domains tested ($ps>.54$).

Conclusions: Among active duty service members, clinical levels of mental health symptomatology may negatively impact neurocognitive functioning. More research is needed to fully understand the impact of subclinical mental health symptoms on functioning among active duty service members.

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S. LEVY, A. WATERS & D. GANSLER. Exploration of the Underlying Mechanisms of Delay Discounting.

Objective: Given the choice, many people would choose a smaller, immediate reward over a larger, delayed reward, indicating the subjective value of a reward is discounted as a function of time. This phenomenon is referred to as *delay discounting* and represents a facet of impulsivity associated with reward processing. The literature has generally been divided regarding the underlying mechanisms of delay discounting, and further examination of the specific mechanisms may be helpful to identify factors that may predict relapse in people with addiction.

Participants and Methods: Data were provided by the Human Connectome Project. Data from 1,050 healthy adults ages 22-35 years old were analyzed. Penalized regression with best subset variable selection was used to evaluate four frameworks each predicting a measure of delay discounting: demographic characteristics, cognitive functioning, personality traits, and neuroimaging. The delay discounting task identified indifference points in which a person is equally likely to choose a smaller reward sooner versus a larger reward later. The area-under-the-curve measure was used as a valid and reliable summary measure of how steeply an individual discounts delayed rewards.

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Results: A subset of three cognitive variables were most predictive of delay discounting. The variables, from the NIH Toolbox, included the Dimensional Change Card Sort Test, Oral Reading Recognition Test, and the Picture Vocabulary Test, and accounted for 9.34% of the variance of delay discounting.
Conclusions: These findings suggest that the extent an individual discounts future rewards (i.e., delay discounting) was most associated with cognitive variables representing executive function (e.g., cognitive flexibility, working memory) and verbal skills (e.g., vocabulary fund, comprehension). These findings suggest that cognitive functioning may be an important predictor of delay discounting, and treatments that target cognition may be particularly useful for modulating an individual's discounting behavior.
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A. LIEBESKIND, K. KNUDSEN, Y. KENETT, S. BOOKHEIMER & R.M. BILDER. Working Memory and Latent Semantic Processes in Convergent Creative Thinking.
Objective: A putative link between working memory (WM) and exceptional creativity is debated. This study examined associations of WM with component processes of convergent thinking.
Participants and Methods: Subjects included exceptional (Big C) visual artists and scientists and a Smart Comparison Group (SCG) (*N*=95) who were matched on demographics and IQ. We measured WM with Spatial and Verbal Maintenance and Manipulation Tests and convergent thinking with the Remote Associates Test (RAT). The RAT presents trios of prompt words from which subjects produce another, related word to the trio. Responses are strongly or weakly related to each prompt. "Correct" responses often balance semantic relatedness across prompts. Using latent semantic analysis, we computed a response deviation index (RDI): the distance from each response to the prompt words relative to the average distance (lower scores = less deviation/more balance). We also computed RAT total score. We hypothesized that WM would correlate positively with total correct and negatively with RDI.
Results: Generalized linear model with WM test type and condition as within subject factors, group as a between subject factor, and either RAT total or RDI as covariates, revealed estimated marginal mean of WM across groups was associated with RAT total score, $F(2, 87) = 14.27$, $p < .001$. Correlations of the different WM test-conditions with RAT total score ranged from $r(94) = .22$ to $.34$ ($p = .03$ to $.001$). No significant association was found between RDI and WM scores or between RDI and RAT total scores. There were no main effects of groups or interactions with group on WM, RDI, or RAT.
Conclusions: The finding that WM relates to RAT scores extends prior findings that WM supports convergent thinking. The lack of association between RDI and WM also suggests that the efficacy of convergent thinking on this task is unrelated to the balance of semantic relatedness, and this may be independent of WM functions. The findings seem general across Big C and SCG.
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E. SILVERMAN-LLOYD, K. KNUDSEN, Y. KENETT, S. BOOKHEIMER, R.M. BILDER & A. LIEBESKIND. Risk-Taking, Openness, and Latent Semantic Processes in Convergent Creative Thinking.
Objective: We explored the possible link between risk-taking, creativity and openness in convergent thinking processes.
Participants and Methods: Participants included exceptional (Big C) visual artists (VIS), scientists (SCI), and a Smart Comparison Group (SCG) (*N=98*). To measure convergent thinking, we used the Remote Associates Test (RAT). Participants were asked to produce a fourth word related to trios of prompt words. Incorrect answers tend to be less related to prompt words than correct answers. Using latent semantic analysis, we computed a distance score (DS): the average distance from responses to prompts. We computed a risk-taking index (RTI): the ratio of correct answers and total answers (higher scores = less risk-taking). We also examined the NEO Openness Factor. We hypothesized that VIS would have lower RTI than SCI and SCG, Big C groups would have smaller DS, and Openness would be positively associated with RTI and DS.
Results: We found a robust negative correlation between RTI and DS that survived conservative Bonferroni correction, $r(98) = -.49$, $p < .001$. Groups significantly differed in Openness, $F(2,99) = 5.8$, $p < .004$, being higher in VIS ($M = 100$, $SD = 9.0$) than SCG ($M = 90$, $SD = 12$) but not SCI ($M = 94$, $SD = 12$). Independent sample t-tests revealed Big C ($M = 97$, $SD = 11$) scored higher than SCG on Openness, $t(2,99) = 2.8$, $p < .007$, but Openness was not associated with RTI or DS. No main effects of group were found for RTI or DS.
Conclusions: The finding that groups differed in Openness extends prior findings that Openness is related to creativity. The negative relationship between RTI and DS indicates that higher risk-takers gave answers that were further away in semantic space from the prompt words and suggests that risk-taking may be disadvantageous for convergent thinking processes. Future research could focus on examining whether risk-taking may benefit divergent thinking processes.
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H. LIU, S.A. LANGENECKER, N.H. PLISKIN, M. LAMAR, R. NUSSLOCK & S. SHANKMAN. Executive Dysfunction as Risk for Depression.
Objective: Executive dysfunction is commonly seen in individuals with major depression disorder (MDD); however, few studies have examined whether deficits in executive function (EF) connote vulnerability for MDD. We therefore examined whether 1) EF is worse among individuals with current MDD and individuals with remitted MDD, compared to healthy controls, 2) EF is positively correlated within sibling pairs, and 3) family history of MDD is associated with worse EF.
Participants and Methods: Participants were 402 individuals divided into four groups: current MDD ($n = 23$), remitted MDD ($n = 152$), psychiatric control ($n = 65$), and healthy control ($n = 162$). Current and lifetime psychiatric diagnoses were assessed via the Structured Clinical Interview for DSM-5 (SCID-5). Two components of EF: set shifting and inhibition, were assessed using four subtests from a standardized battery of EF (Delis-Kaplan Executive Function System; DKEFS).
Results: Current MDD group exhibited worse performance than healthy controls on set shifting, $b = -.34$, $SE = .15$, $t(373.74) = -2.30$, $p < .05$, but not inhibition. Remitted MDD group exhibited worse performance than healthy controls on both set shifting, $b = -.19$, $SE = .08$, $t(374.01) = -2.44$, $p < .05$ and inhibition, $b = -.22$, $SE = .08$, $t(373.98) = -2.70$, $p < .01$. Psychiatric controls did not significantly differ from healthy controls on EF abilities. Siblings' EF abilities were positive correlated for both set shifting ($r = .28$, $p < .05$) and inhibition ($r = .42$, $p < .05$). EF did not significantly differ between individuals with a family history of MDD and those without.
Conclusions: Set shifting deficits are associated with both current and remitted MDD. Results suggest that EF abilities are familial, although family history of MDD was not associated with worse EF. This finding may be contributable to incomplete family psychiatric data and potential false negatives. Results lend some support to our hypothesis that set shifting may be a potential vulnerability marker for depression.
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R. LOCKRIDGE, M. BRUCHHAGE, C. LOISELLE, C. CASNAR, R. MCLEAN, V. D'SA & S. DEONI. Early Executive Functioning and Functional Connectivity in Preschool Children.

Objective: Despite our understanding of its developmental course and impact on behavior and adaptive skills in school-aged children, the neurobiological underpinnings of early executive functioning (EF) development in typically developing children is less well-defined. This study aims to build upon structural research and identify brain networks that are implicated in EF development of preschool-aged children.

Participants and Methods: 70 children (32 males) ages 30-72 months. Children were divided into four groups (12-month age intervals; 27-32 each). EF assessed by parent report using the Global Executive Composite of the Behavior Rating Inventory of Executive Functioning-Preschool version (BRIEF-P), obtained on the day of imaging. Imaging: Siemens 3T (3D T1-weighted images of brain obtained using: TR/TE/FS=14/5.9/3, 15^0 flip angle, 128x128 acquisition matrix, 1.5mm slab thickness). Voxel Based Morphometry: Images were nonlinearly aligned, and images were spatially normalized to MNI space using ANTS and SPM8 with Matlab 2016b. Developmental gain determined by a correlation matrix created for each which contrasted the BRIEF matrix of each older group against the younger. Analyses were corrected for age and gender and included intracranial brain volume for global normalization.

Results: All differences significant at a $p<.05$ level. Group 1 (24-36m): an increase of functional connectivity in the salience network; Group 2 (37-48m): decrease of functional connectivity in the salience network; Group 3 (49-60m): decrease of functional connectivity in the dorsal attention network; Group 4 (61-72m): increase of functional connectivity in the visual lateral network.

Conclusions: Early changes are observed across networks closely associated with EF and related skills including detecting and filtering salient stimuli, orienting attention to task, and visual processing. Results suggest that early EF development is marked by growth periods that are rapid and at times, nonlinear.

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C. MCELWEE, T. VICTOR & E. MERZ. The Influence of Early Life Socio-Environmental Factors on Neuropsychological Test Performance in A Healthy Adult Sample.

Objective: Attempts have been made (with research efforts encouraged) to deconstruct the "race" concept into language, cultural, and life experience variables that can help explain performance differences found between ethnic groups (Romero et al., 2009). The extant empirical literature reveals that early environmental factors and life experiences (e.g., socioeconomic status) are related to cognitive test performance in adulthood (Byrd et al., 2006). This study examined the explanatory value of early life childhood resources in the relationship between ethnicity and neuropsychological test performance in adulthood.

Participants and Methods: Neurologically and psychologically healthy African American (AA, n= 40), Caucasian (CA, n=14), and Hispanic (H, n=107) college students ranging from 19-23 years of age completed a comprehensive neuropsychological battery that included tests of executive function and an extensive background questionnaire.

Results: A one-way analysis of variance (ANOVA) revealed that the CA group was significantly older (F (2, 160) =18.384, p = .045) compared to the AA and H groups though the groups did not differ in terms of years of education or gender. Further, ANOVA with subsequent post-hoc analyses revealed there were no significant group differences in test performance on the COWAT, Stroop-C or Trailmaking B. Similarly, hierarchical multiple regression analyses revealed that group performance differences on executive function tests were small or nonexistent and only partially explained by years of education and early life financial resources.

Conclusions: The results are discussed in light of the existing literature, study strengths, and limitations, as well as directions for future research.

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E. MCGLADE, M. LEGARRETA, J. DIMUZIO, E. BUELER & D. YURGELUN-TODD. Impulsivity and Aggression in Females Compared to Males.

Objective: The US has seen recent increases in incidents of violence, which is of significant concern (Federal Bureau of Investigation, 2016). Associations between aggressive behavior and psychiatric syndromes including suicide also have been observed (Conner et al., 2009; Gvion & Apter, 2011; Hart et al., 2017; Hartley et al., 2017; McCloskey & Ammerman, 2017). These associations suggest that aggression is a critical area of study to improve interventions and increase both public and personal safety.

Participants and Methods: Two hundred and eight veterans (49 females, 159 males) between the ages of 18 and 55 were recruited from Salt Lake City and the surrounding communities. Participants completed the self-report Barratt Impulsiveness Scale (BIS) and Buss-Perry Aggression Questionnaire (BPAQ).

Results: Males reported increased aggression compared to females ($p=0.003$); there were no sex differences in self-reported impulsivity. Males demonstrated a significant association between subscales of Total Aggression and Total Impulsivity ($p<0.001$), while females did not ($p=0.38$). Additionally, males showed correlations between BIS Planning, Verbal Aggression, and Hostility; BIS Motor, Physical Aggression, Verbal Aggression, Anger, and Hostility; and BIS Attention, Verbal Aggression, Anger, and Hostility. Females showed only associations between BIS Motor, Anger, and Hostility and BIS Attention and Hostility.

Conclusions: These results suggest that males with impulsive behavior may report a general pattern of increased aggressive tendencies, whereas females who report reduced attention and doing things without thinking may also report increases in aggressive behaviors. Males with increased impulsivity and females with higher motor impulsivity and attention problems may benefit from assessment and intervention focused on attention and inhibitory capacity. Further investigations should focus on sex differences in executive function as they relate to aggression.

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A.B. MCGRATH, K. MULHAUSER & J. WEINSTOCK. Cross-Sectional Examination of College Student Health Behavior Engagement and Self-Reported Executive Functions.

Objective: College is a developmental period when risky behaviors that are potentially detrimental to health increase (e.g., substance use, poor sleep) and certain health sustaining behaviors decrease (e.g., exercise, nutritious diet). While a bidirectional relationship exists between executive functions (EFs) and health behaviors, these analyses have been limited to a specific behavior or EF. The present analyses sought to examine the relationship between health behaviors and EFs in their entirety.

Participants and Methods: Participants (N=1,394) were college students, age 18-24 years old, from three large Mid-western universities. The sample was predominantly female (74%) and White (64%). Participants completed online questionnaires of EFs (Barkley Deficits in Executive Functioning Scale; BDEFS) and healthy behaviors (e.g., diet, exercise, substance use, sleep). Latent class analysis and MANOVA were used to identify classes and examine differences in EFs across identified classes, respectively.

Results: A three-class model was chosen as the optimal solution to describe health behavior engagement variables: Class 1 *low health engagement* (n=235), Class 2 *moderate health engagement* (n=390), and Class 3 *high health engagement* (n=769). MANOVA found significant differences in EFs across classes, $F(10, 2774)=19.81$, $p<0.001$.

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Bonferroni post hoc comparisons revealed Classes 1 & 2 had significantly greater EF dysfunction compared to Class 3 on scales of time management, organization, inhibition, and motivation. On a scale of emotion regulation, all three classes differed from each other (Class 2 > Class 1 > Class 3).
Conclusions: Three classes derived from health behaviors were characterized by differing rates of health-promoting behaviors (low to high). Latent classes differed statistically on a measure of EF dysfunction with the healthier class generally reporting greater EF abilities compared to classes characterized by less-healthy behaviors. EFs may play an important role in the engagement of health-promoting behaviors.
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E. MÉNÉTRÉ & M. LAGANARO. Sequential Congruency Effect in a Verbal Stroop Across the lifespan.
Objective: The Stroop and sequential congruency effects (SCE) have widely been studied in cognitive psychology. However, the decomposition and evolution of these effects across the entire lifespan remains unclear. Classically, conflict adaptation (facilitation observed for 2 consecutive incongruent items) and the opposite effect (inhibition suppression mechanisms from an incongruent to a congruent trial, or attentional disengagement effect) are not dissociated from the condition repetition effect. This study then aims to bring a better understanding to the 2 dimensions of the SCE mediated by the repetition effect, using neutral trials, left apart in this literature.
Participants and Methods: 123 participants aged from 10 to 81 year-old (splited in age groups: 10-13; 16-18; 20-30; 40-50; 60-70; 70-81), were submitted to a classical verbal Stroop task. Items presentation order was pseudo-randomized enabling the balanced analysis of two consecutive items in all conditions.
Results: The Stroop effect was present for each age group. Regarding the SCE decomposition, an inversed effect of conflict adaptation (namely slower latencies for incongruency repetition compared to an incongruent trial preceded by a neutral one), was highlighted only in children, but an effect of repetition of condition was observed on all age groups (except for the group 70-80), and an effect of attentional disengagement was present in children and the elderly only.
Conclusions: These results challenge the existence of the conflict adaptation effect, which is not observed in any age-group, while the 2 other effects, attentional disengagement and repetition priming are more consistently observed, although differently across the lifespan. Based on the decomposition described here, a second study will try to dissociate attentional and executive processes present in the Stroop task to isolate patients with impairment in one of these 2 dimensions, thus giving a better sensibility to the Stroop.
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G. MERCURI & R. HOLTZER. Engagement in Cognitively Stimulating Activities Mediates the Relationship Between Openness and Attention/Executive Functions in Older Adults.
Objective: The association between Openness and Attention/Executive Functions (AEF) was examined in older adults. The *use it or lose it* hypothesis (Hultsch et al.,1999) states that aging adults who engage in more cognitively stimulating activities (CSA) tend to show greater preservation of their cognitive skills; thus, we assessed whether: 1) higher Openness would be associated with better AEF; and 2) engagement in CSA would mediate the relationship between Openness and AEF.
Participants and Methods: 477 community-dwelling older adults (65+ years) from Westchester County, NY [age=75.7(6.5); %female=55.3] enrolled in the Central Control of Mobility and Aging study. Participants completed annual neuropsychological, psychological, and mobility assessments. AEF was a composite variable including TMT-A&B, COWAT, and DSST. Openness was assessed via the Big-5 Inventory. CSA were assessed with the Leisure Activity Questionnaire.
Results: Step 1 of the mediation model revealed a significant positive association between Openness and AEF (β= .03; 95% CI= .02-.04; p <.001) when removing the effect of CSA. Step 2 showed a significant positive association between Openness and CSA (β= .03; 95% CI= .01-.05; p <.005). Step 3 showed a significant positive association between CSA and AEF when controlling for Openness (β= .11; 95% CI= .06-.15; p <.001). Step 4 revealed that in the presence of CSA, Openness was a significant predictor of AEF (β= .02; 95% CI= .02-.03; p < .001). A significant Sobel test (z= 2.6, p <.05) indicated that CSA partially mediated the relation between Openness and AEF. Analyses controlled for age, gender, education, and medical comorbidity.
Conclusions: The study results support the *use it or lose it* hypothesis (Hultsch et al., 1999). The positive association between Openness and AEF was partially mediated by engagement in and curiosity for cognitively stimulating experiences. The findings suggest that those who are more open to and highly engaged in CSA may have a later in life advantage in preserving their cognition.
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M.A. NIERMEYER, K.L. ROTH, M. GIBBS, A. RAY & Y. SUCHY. Executive Functioning and Expressive Suppression Among Older Adults: The Role of Non-Restorative Sleep and Pain Severity.
Objective: Expressive suppression has been shown to relate to performance on tests of Executive Functioning (EF) among older adults (Franchow & Suchy, 2017; Niermeyer, Ziemnik, Franchow, Barron, & Suchy, 2018). However, it is unclear whether expressive suppression impacts EF beyond other acute factors such as pain severity and non-restorative sleep, both of which have also been shown to relate to performance on EF tests, and to contribute to expressive suppression (Nes, Roach, & Segerstrom, 2009). The goal of this project was to understand whether there is a unique effect of expressive suppression on EF while controlling for self-reported depression, non-restorative sleep, and pain severity.
Participants and Methods: 99 older adults (Mean Age=68) completed measures of EF using subtests from the Delis-Kaplan Executive Function System as well as self-report measures of degree of sleep restoration on the day of testing, expressive suppression in the 24-hours prior to testing, pain severity during testing, and depression.
Results: Hierarchical regression showed that self-reported expressive suppression in the 24-hours prior to testing accounted for a significant amount of variance in a composite of EF age-corrected scaled scores beyond self-reported depression, degree of sleep restoration, and pain severity (R^2 Δ = .06, p = .009). Multiple regression indicated that both pain severity and expressive suppression accounted for a significant amount of unique variance in the EF (*both Bs* < -.068, *both p-values* < .03), such that more expressive suppression and higher pain severity were both associated with lower EF scores.
Conclusions: The current results replicate the finding that expressive suppression accounts for variance in EF among older adults, and extend past work by showing that self-reported expressive suppression accounts for *unique* variance in EF beyond more commonly assessed variables (e.g., pain level) suggesting that measuring expressive suppression may improve the accuracy of EF assessment.
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A. OLSEN & T. LAFAVOR. Impact of Trauma on Verbal and Non-Verbal Executive Function in Adolescents.
Objective: Prior research has found deficits in executive functioning in adolescents with documented and substantiated maltreatment histories. This study examined the impact of maltreatment on performance on

measures of verbal and design fluency in adolescents using a retrospective self-report measure of childhood maltreatment.
Participants and Methods: The study included 54 adolescents 13 to 17 years old ($Mean_{age}$ = 14.87, 59.3% White, 55.6% trauma positive) recruited from the community. Youth and a parent or caregiver each completed questionnaires and were interviewed regarding trauma history, significant life events, and sociodemographic information. Youth were administered the Delis-Kaplan Executive Function System (D-KEFS) Verbal Fluency and Design Fluency subtests. the Wechsler Abbreviated Scale of Intelligence (WASI), and the Childhood Trauma Questionnaire (CTQ).
Results: Hierarchical regressions revealed that severity of childhood maltreatment significantly predicted worse performance on a measure of design fluency (D-KEFS Design Fluency Condition 1) above and beyond age, gender, and IQ (ΔR^2 = .09). One-way ANOVAs from this study also suggest adolescents exposed to trauma perform worse on a measure of verbal fluency [F (1, 52) = 2.92, p = .09], which requires shifting between two categories.
Conclusions: These findings further support past research on executive functioning in a community sample of adolescents who have experienced maltreatment. Moreover, this study highlights the importance of not only including those with documented and substantiated maltreatment histories in studies, but self-reported histories as well.
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K.P. MONTES INFANTE & X. ORTIZ. Neuropsychological Characteristics of Flexibility and Cognitive Inhibition in Preschoolers.
Objective: Childhood is a critical period in the development of executive functions. Impaired functions may lead to school failure and marginalization. Evaluating these functions at an early age could facilitate timely diagnosis of learning disorders and adequate interventions. The objective of this study was to compare based on gender and age the neuropsychological characteristics of cognitive flexibility (CF) and inhibition (CI) among preschool children with a normal development (n= 64) who studied at either a public or a private school.
Participants and Methods: The research design was quantitative, non-experimental, comparative and cross-sectional. Institutional authorization was requested and informed consent, provided. The Clinical History and the Neuropsychological Battery for Preschoolers (BANPE), recently created in Mexico, was applied. For the data analysis, we used descriptive statistics, t-tests, Pearson's correlations and one-way ANOVA.
Results: Results showed that the development of CF and CI were within the parameters of the norm. When comparing children by type of school they attended, there were no statistically significant differences in CF, but there were in CI. There are statistically significant gender differences and correlations between CF and CI and age.
Conclusions: In conclusion, the cognitive flexibility component was not affected by the type of school. Indicators of cognitive inhibition were influenced by the type of school. Indicators of flexibility and cognitive inhibition were influenced by the gender of the participants. The components of flexibility and cognitive inhibition were influenced by age.
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P. PEREZ DELGADILLO, I. TOURGEMAN, L.F. HERNÁNDEZ & S. TANNER-WOORDWARD. The Relationship Between Gestational Length and Performance on Measures of Executive and Intellectual Functioning: An Empirical Study.
Objective: Pre-term birth has been associated with an increased risk for neurocognitive deficits, specifically in domains including executive function and intelligence. While the current literature has explored the performance of moderate to late pre-term children on tasks of executive function and intelligence, separately, research has been limited at analyzing both cognitive domains simultaneously in children born from typical to pre-term pregnancies. The present study sought to evaluate whether gestational length was associated with impaired performance on specific neurocognitive domains including executive and intellectual function measures.
Participants and Methods: 197 culturally diverse patients between 8 to 18 years of age received a comprehensive neuropsychological evaluation at the pediatric neuropsychology and rehabilitation department of a major public South Florida Hospital between 2009 and 2017. A Pearson correlation was conducted between gestational length (measured by weeks) and performance on tasks of verbal fluency and intellectual functioning, including phonetic, semantic and category switching and FSIQ measures.
Results: No statistically significant differences were observed between gestational length and performance on measures of verbal fluency and intellectual functioning when evaluating The Pearson product-moment correlation coefficient (P>0.05).
Conclusions: The preliminary results demonstrated that although the literature reviewed showed a relationship between pre-term birth and deficits in executive and intellectual functioning, these variables were not significantly related when evaluating performances on selected verbal fluency subtest, as well as on the WISC-IV in a diverse clinical sample of 197 subjects. Further research with a more diverse and larger sample is recommended
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U.D. PERSAUD, K. JOHNSON, E.A. MCLEAN, B. FREER & L. TIERSKY. Cognitive Flexibility Abilities Predict Subjective Cognitive Complaints in Adults.
Objective: Research suggests that subjective cognitive complaints (SCC) may be related to executive processes, including working memory, attentional shifting, and cognitive flexibility. However, the nature of the relationship between SCC and executive functioning remains unclear. The present study aimed to examine the relationship between cognitive flexibility and SCC in adults.
Participants and Methods: Participants were 247 individuals (62.3% female) between the ages of 18 and 67 (M = 30.2, SD = 11.3) seeking neuropsychological evaluation for cognitive complaints at a psychological service center in the northeast US. Participants completed three subtests of the Delis-Kaplan Executive Functioning System assessing cognitive flexibility: the Color-Word Interference Task, Verbal Fluency, and Trail Making Test. Participants also completed the Cognitive Failures Questionnaire to assess subjective cognitive failures in everyday life.
Results: Linear regressions were conducted to assess whether neuropsychological measures of cognitive flexibility were related to cognitive failures, after controlling for age and gender. Results indicated that poorer performance on Letter-Number Sequencing was associated with greater SCC, B = .031, SE = .015, r^2 = .02, p < .05. Age was also positively associated with SCC, B = .01, SE = .004, r^2 = .03, p < .05. Results indicated a marginally significant negative association between the Inhibition Switching Condition of the Color-Word Interference Task and SCC, B = -.03, SE = .016, r^2 = .01, p = .06.
Conclusions: Our findings are consistent with literature signifying that greater SCC are related to poorer performance on tasks with greater executive demands. Specifically, our results indicate that individuals who reported greater SCC performed poorer on tasks requiring attentional shifting. Therefore, problems with attentional shifting and complex cognitive demands may translate to difficulties in daily life and contribute to SCC.
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A. PHILI, E.E. MORAN, C.L. CROOK, J. STIVER, J. WEATHERS, R. ZIMMERMAN, D. TOTO & M. ZIMMERMAN. Preserved Neuropsychological Test Performance In Young Adults with Elevated Depression and Anxiety Symptoms.

Objective: Depression and anxiety are linked to neuropsychological impairment. The current study aimed to assess the effect of depression and anxiety symptoms on tests of attention, processing speed and executive function in a non-clinical population.

Participants and Methods: 216 participants (mean(sd): age=20.4(.14); education years=14.2(.16)) were included from a University in the Bronx, NY. The present study is derived from a larger parent study that examined neuropsychological function and sleep. Participants completed the Beck Anxiety Inventory (BAI) and Beck Depression Inventory II (BDI II), and after an average of 14 days, a neuropsychological battery with paper-and-pencil measures and Cogstate, a computerized test battery. Attention and processing speed were measured using the Trail Making Test part A (TMTA), Identification Reaction Time (IRT), Groton Maze Chase Test (GMCT); executive function measured using the Trail Making Test part B (TMTB).

Results: BAI and BDI II scores did not differentiate test performance. Minimal anxiety scores in comparison to grouped mild, moderate, severe anxiety scores did not differentiate on attention and processing speed (TMTA; t = -1.02, p=0.31, IRT; t=-0.732, p=0.46 and GMCT; t=0.82, p=0.41) or executive function (TMTB; t=-1.12, p=0.27). Minimal depression scores in comparison to grouped mild, moderate, severe depression scores did not differentiate on attention and processing speed (TMTA; t=-0.39, p=0.70, IRT; t=-0.21, p=0.83, GMCT; t=.08, p=.94) or executive function (TMTB; t=0.03, p=0.97). Linear regression incorporating the interaction between depression and anxiety revealed no interaction for attention and processing speed (TMTA; F(198)=0.79, p=0.46, IRT; F(197)=0.28, p=0.76; and GMCT; F(197)=0.29, p=0.76), or for executive function (TMTB; F(195)=.81, p=.45).

Conclusions: Contrary to prior studies, the present study suggests elevated levels of depression and anxiety may not impair attention, processing speed and executive functions when isolated in a non-clinical population.

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D.T. PULSIPHER, E. RETTIG, E. KRAPF & L.D. STANFORD. Patient and Caregiver Reports of Anxiety, Depression, and Executive Dysfunction in Children with Heterogeneous Neurodevelopmental Disorders.

Objective: Few studies have reported adolescent Youth Self Report (YSR) and caregiver Child Behavior Checklist (CBCL) discrepancies in clinical samples. We examined YSR-CBCL discrepancies on Anxiety/Depression (AD) scales in adolescents with heterogeneous neurodevelopmental disorders. We hypothesized that low adolescent (LA) AD report relative to high caregiver (HC) AD report (i.e., LA-HC group) would have greater executive dysfunction (ED) due to their lack of insight about their own emotional functioning.

Participants and Methods: 395 adolescent-caregiver dyads completed the YSR and CBCL, Behavior Rating Inventory of Executive Function (BRIEF), and Conners 3rd Edition-Parent (C3-P) as part of neuropsychological evaluations. AD T-score discrepancies were calculated by subtracting CBCL from YSR. Adolescents were classified by discrepancy magnitude: LA-HC (≤-1 SD; n=94), no discrepancy (>-1 SD to <1 SD; n=268), and high adolescent (HA) AD report relative to low caregiver (LC) AD report (i.e., HA-LC group; ≥1 SD; n=33). Frequentist and Bayesian independent samples t-tests compared only LA-HC to HA-LC on age, IQ, and T-scores on BRIEF composite and select C3-P indices.

Results: The two groups did not significantly differ on IQ (p=0.31, d=0.21), but LA-HC was younger (p=0.03, d=0.44). LA-HC had significantly greater ED than HA-LC on BRIEF composite (p<0.001, d=1.07) and C3-P Executive Function (p=0.01, d=0.48), Inattention (p<0.001, d=0.97), and Hyperactivity (p<0.001, d=0.82) indices. Corresponding Bayes factors (BF) provided moderate (BF=4.4) to extremely strong support (BF=395-52,209) for the alternative hypothesis.

Conclusions: Although study design precluded establishing causality, more ED in LA-HC could have reflected greater neurodevelopmental impact on executive neural substrates that inform awareness and insight. Clinicians should consider the reciprocal relationship between one's executive functioning and the impact of such on emotional status.

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A. RINALDI & J. MEHM. Academic Procrastination as Evidence of Executive Functioning Impairment in College Students.

Objective: Procrastination research has traditionally focused on personality and situational factors to explain procrastination. The literature is sparse addressing potential explanations that might be attributable to brain functioning. Considering the established relationship between procrastination and poor time management and poor judgement, it is important to consider whether executive functioning is impaired in individuals with procrastination difficulties.

Participants and Methods: Eighty three undergraduate students from a private Northeastern University were enrolled as part of course credit for research participation. Average age was 19 (range 18-24), the majority were white (n=47; 56.6%), and in Freshman year (n=48; 57.8%). Participants completed self-report questionnaires on procrastination (Lay Procrastination scale), executive functioning (BRIEF), and personality (BFI) in addition to four neuropsychological measures (Trail Making Test, COWAT, FAS, and WCST).

Results: Correlational analyses revealed significant relationships between Procrastination score and BFI Consciousness (r =-.71; p<.01), BFI Neuroticism (r =.25; p<.05), all three BRIEF composites (BRI r =.25; p<.05, MI r =.43, p<.01; & GEC r =.31, p<.01), and Trails B performance (r =-.30, p<.01). Linear regression analyses to predict procrastination score were significant r^2 = .57, p<.001. BFI Conscientiousness, BRIEF BRI composite, and Trails B emerged as significant predictors. As such, they were entered into a second regression, with BFI Conscientiousness and Trails B emerging as significant predictors (t =-8.78, p<.001 & t =-3.322, p<.001).

Conclusions: Results are the first known evidence of measurable cognitive functioning either as the cause of or contributor to procrastination behavior. The study provided further evidence of a strong relationship between personality and procrastination (Conscientiousness). Future research should include broader demographics for subjects and additional cognitive measures.

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F.E. ROBERTSON, M. WOOD, R. GIBB & C. GONZALEZ. Does Musical Training Affect Executive Function in Adolescents?

Objective: Executive functions (EF) are high level cognitive abilities which are important for success in school and life. Previous research has documented anatomical changes and EF improvement in children and adults with musical training. Adolescence is a critical period in which the effects of musical training have not been fully examined. Here we examined adolescents in a battery of objective and subjective measures of EF and correlated these results with subjective measures of musical ability and training.

Participants and Methods: Participants were between 14 and 18 years old, healthy high school students from the Lethbridge area. Participants completed a subjective measure of EF, the Behavioural Rating Inventory of Executive Function (BRIEF), as well as a battery of objective executive function tasks. This battery included the Tower of Hanoi (ToH), Wisconsin Card Sorting Task (WCS), Bomb Risk Evaluation Task (BRET), and Iowa Gambling Task (IGT).

Participants also completed a subjective measure of their musical ability. First, they were asked about their history of musical practice and training, (eg. How many years of formal musical training have you received?). Second, participants ranked their musical ability on a series of one to five scales (eg. ability to read music).
Results: Correlation analysis demonstrated that participants who reported better musical ability scored better on all elements of the BRIEF ($p<0.05$), made fewer errors in the WCS ($p<0.01$), and demonstrated less risk seeking behaviour on the BRET ($p<0.05$). Increased practice time was also associated with lower risk seeking, and better EF ($p<0.05$).
Conclusions: Increased levels of musical ability and training were associated with multiple improvements in EF. This effect was particularly strong in the area shifting between tasks, as measured by the WCS. These effects were seen both in teens with musical experiences in childhood, and those who had just begun to practice recently. Musical training maintains its ability to improve EF throughout adolescence.
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K.L. ROTH, Y. SUCHY, M. NEIRMEYER, A. RAY & M. GIBBS. Executive Functioning as a Predictor of Walking Speed and Counting Accuracy During Dual-Task Walking.
Objective: Executive Functioning (EF) is a known predictor of falls as well as single- and dual-task gait performance. Dual-task gait performance can be measured both as walking speed and as the accuracy on the cognitive portion of the task (typically serial subtraction). However, performance on working memory tasks such as serial subtraction is known to be susceptible to anxiety. Thus, it is not clear whether anxiety and EF differentially contribute to walking speed vs. counting accuracy during dual-task gait performance.
Participants and Methods: 88 community dwelling older adults (63% female), ranging in age from 60-93 years old (M=68), completed a dual-task gait task which involved the participants avoiding obstacles while walking and counting backward by threes. Executive functioning (DKEFS) and anxiety (Geriatric Anxiety Inventory; GAI) were also assessed.
Results: The correlation between the dual-task gait completion times (walking speed) and percent accuracy for counting backward was -.475 (p<.001). Hierarchical linear regressions showed that (1) EF accounted for variance in walking speed above and beyond counting accuracy and GAI [$Fchange(1,84) = 5.6$, p=.020], whereas GAI did not contribute to the model; and (2) GAI accounted for variance in counting accuracy beyond walking speed and EF [$Fchange(1,84) = 4.6$, p=.035], with EF not contributing to the model.
Conclusions: The current study shows that although walking speed and serial subtraction during dual-task walking are correlated with each other, walking speed relies more heavily on EF and as such may be a better predictor of risk for falls (which is known to be related to EF). In contrast, counting accuracy seems to be affected by anxiety. Future research should examine whether anxiety itself might be related to falls above and beyond EF.
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P.K. ISQUITH, M. ABECASSIS, K. WELSH & R.M. ROTH. Adolescents with Poorer Self-Regulation Perceive Peers as Taking Greater Risks.
Objective: Prior research has identified factors such as self-regulation that may moderate the relationship between risky behaviors in adolescence and perceptions of negative peer behaviors. In the present study, we examined whether adolescents' perceptions of risk taking behavior in their peers may reflect their own perceived executive function capabilities.
Participants and Methods: Fifty-seven healthy adolescents (12-18 years; 19 boys, 38 girls) completed the Behavior Rating Inventory of Executive Function – Adolescent Self-report (BRIEF-SR) and 7 questions from the Youth Risk Behavior Survey (YRBS) regarding seatbelt use, cigarette and cannabis use, driving under the influence, and sexual activity before the age of 13.
Results: Item-total correlations showed that the seatbelt use item was a poor fit with the adapted 7-item YRBS and was removed, leaving six items in the final scale with acceptable reliability (Cronbach's $\alpha = .70$). In the overall sample, perceptions of greater peer risk taking behavior were associated with worse self-reported inhibition and working memory, and with trends towards worse emotional control, planning and organization, and self-monitoring. Notably, girls perceived greater risky behavior among peers than was endorsed by boys. No association was observed between risk perception and executive function in boys. In contrast, greater risk taking was associated with worse inhibition and working memory in girls. Results were unrelated to age.
Conclusions: Adolescent girls, but not boys, who described themselves as more impulsive and having worse working memory perceived their peers as more risk-taking. Replication in larger samples is required. Further research is needed to determine whether poorer self-report executive function and greater perception of risky peer behavior can help predict the likelihood of adolescents engaging in risky behaviors.
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A. MAFFETT, C. MISKOVITZ, A. FEDER, K. BORESS, A.M. CWIEK, A. CUNNINGHAM & R. SKEEL. Validation of a Novel Behaviorally-Based Measure of Delay-Discounting in Adults.
Objective: The current study aimed to validate a novel behavioral-based measure of impulsivity in adults. The novel delay discounting task utilized YouTube clips and their subjective ratings as a measure of reward magnitude. This study compares the strength of the relationship of the novel measure's ratings of impulsivity to other known measures of impulsivity.
Participants and Methods: Eighty-two undergraduate students completed two computer measures of impulsivity and the Barrett Impulsiveness Scale (BIS-11). The computer tasks consisted of a novel procedure of delay discounting based on YouTube videos and a Flanker task. The novel YouTube task was composed of two conditions: Small Reward Condition (videos with 75% positive ratings) and Large Reward Condition (videos with 95% positive ratings). Participants were required to indicate whether they preferred to watch the smaller reward video immediately or the larger reward video after a delay. The task consisted of 20 trials with time delays presented in ascending and descending order (e.g., 20s, 30s, 45s, 60s).
Results: There was a positive relationship between the frequency in which participants discounted and total scores on the BIS-11, $r = .258$, indicating that participants who more frequently chose to watch the lower rated videos immediately reported higher levels of impulsivity. There was a significant difference between discounting in ascending trials ($M = 38.43$, $SD = 33.00$) and discounting in descending trials ($M = 27.47$, $SD = 23.50$. Attentional impulsivity correlated with both ascending ($r = .261$) and descending discounting ($r = .388$). There was a positive relationship between self-control ($r = .233$) and perseverance ($r = .221$) in descending discounting. The flanker task did not correlate with delay-discounting.
Conclusions: Findings from this study provide further support for use of the novel behaviorally-based measure of impulsivity in adults.
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R. TROSSMAN, T. MCAULEY, J.G. MIELKE & S. SPENCE. Do Executive Functions Mediate the Relationship Between Adverse Childhood Experiences and Health Risk Behaviours?

Objective: Adverse childhood experiences (ACEs) are stressful events that occur early in life. They can encompass intensely traumatic experiences, including abuse or neglect, and more common household dysfunction, such as parental divorce. Elevated ACE exposure has been associated with chronic medical conditions that hasten mortality. ACEs thus present a serious public health concern, yet underlying mechanisms that link the experience of early life adversity with maladaptive health outcomes remain poorly understood. Our research seeks to build a biologically plausible neurodevelopmental model of ACE exposure, focusing on the intermediate role of executive functioning (EF). In this study, we hypothesize that EF difficulties will mediate the relationship between ACE exposure and two health-related outcomes relevant to young adults: engagement in health-risk behaviours (e.g., smoking, risky alcohol use; HRBs), and psychological distress (e.g., anxiety, depression; PD).

Participants and Methods: Undergraduate participants (N=86) completed self-report measures of ACEs, EF, HRBs, and PD. Bias-corrected mediation models tested the indirect effect of ACEs on health-related outcomes via EF difficulties.

Results: ACE exposure was significantly related to increased engagement in HRBs and higher levels of PD. The latter was mediated by greater endorsement of EF difficulties.

Conclusions: This work addresses a gap in the ACE literature by evaluating whether EF underlies the link between early adversity exposure and later life health problems. Our results support the view that ACE exposure may disrupt the development of neural pathways that support EF, leading to poorer health outcomes that are evident even by early adulthood. Though additional work will be needed to more rigorously test our model, the findings of this study are an important next step in furthering our theoretical understanding of this important public health issue.

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C. WADE, A.M. WHITAKER, J.C. WOOD & S.H. O'NEIL. Executive Functions in Adults with Sickle Cell Disease.

Objective: Children diagnosed with sickle cell disease (SCD) struggle with executive functions (EF); however, there is a paucity of research on neuropsychological outcomes in adults with SCD. This study aimed to: (1) examine EF in adults with SCD treated with a strategy of early and aggressive Hydroxyurea therapy and (2) explore differences in EF between adults with SCD and healthy controls.

Participants and Methods: 22 patients with SCD and 28 healthy controls (age 18-45) participating in an IRB-approved Children's Hospital Los Angeles study of brain blood flow underwent neuropsychological evaluation using the Delis–Kaplan Executive Function System(D-KEFS) Trail Making and Color Word Interference Tests and the Wechsler Adult Intelligence Scale-4th Edition (WAIS-IV) Digit Span subtest to assess EF. The Wechsler Abbreviated Scale of Intelligence-2nd Edition (WASI-II) was administered to assess intelligence.

Results: There were no significant differences between groups related to age, gender, ethnicity, parental education, or intelligence; however, the control group was estimated to have significantly higher current combined family income as compared to patients with SCD (X^2=(5, N=50)=13.56, p=.02). Therefore, income was controlled for during analyses. Both groups performed in the solidly average range across EF measures and no significant differences were noted between groups for any aspect of EF, including working memory, t(48)=-.11;p=.91; response inhibition, t(48)=1.36;p=.18; or cognitive flexibility, t(48)=.42;p=.68.

Conclusions: Adults with SCD in this study performed comparably to healthy controls. Early and aggressive treatment with Hydroxyurea may improve prognosis and serve as a protective factor against EF deficits in adults with SCD. However, additional research is needed to better understand how treatment protocols influence neuropsychological outcomes in this population.

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R.E. WONG, A.M. WEBBER, C. SWABEY, I. GORDON & M. GARCIA-BARRERA. Examining the Complexity of Executive Functioning in Healthy Young Adults.

Objective: Executive functions (EFs) are considered to be both a unitary and multidimensional construct at an intermediate level of complexity (Friedman & Miyake, 2017). EFs are known as an elusive construct (Jurado & Rosselli, 2007) and correlations between different EF measures (e.g., self-report or computerized) are weak or nonexistent (Toplak, 2013). No studies to date have examined these associations of subjective perception and cognitive performance with EEG measures. A multi-level and multi-method examination of EFs in healthy young adults was conducted using EEG, computerized, and self-report measures to examine the complexity of EFs and their relation to one another within and across measurement modalities. We hypothesize stronger within-level correlations than between-level correlations.

Participants and Methods: 33 healthy university students (ages 19-25; 64% female) were recruited from a mid-sized Canadian city. EEG readings were taken while completing computerized neuropsychological tasks. They also completed self-report questionnaires relating to EFs (i.e., BRIEF). Within-level and between-level correlations were selectively conducted.

Results: EFs are moderately-to-strongly correlated at the self-report level (r = .58-.75) but not at the performance or electrophysiological level. Increased N-back load effects on reaction time and accuracy correlate with fewer and greater shifting problems, respectively (r = -.64-.46). Increased P300 latency correlates with more reported shifting and inhibition problems (r = .67-.68). Increased N200 latency correlates with fewer reported inhibition problems (r = -.51).

Conclusions: Results suggest that EFs are related to one another at the self-report level but not at the performance or EEG level. Findings increase our understanding of EF as a construct and the relationships governing subjective perception, performance, and EEG markers of EF. Further study examining the construct of EF at multiple levels is warranted.

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J. POMMY, B. SEAMAN, E. GONZALES, R.J. THOMA & R.A. YEO. Executive Functioning, Mood, and Mindfulness in Substance Use Disorder.

Objective: Substance use disorder (SUD) has significant effects on brain function, physical health, and quality of life. Efforts have been made to study executive function (EF) in the context of SUD as both a preexisting factor and target for intervention. Understanding the nature of EF impairments among individuals engaging in high-risk drug use has the potential to inform treatment interventions.

Participants and Methods: 12 participants were recruited for a mindfulness treatment study from an outpatient SUD clinic. EF was measured at intake using subtests from the NIH Cognitive Toolbox (NIHCT) and Delis-Kaplan Executive Function System (DKEFS). Self-reported measures of EF, mood, anxiety and trait mindfulness were also collected. EF performance was compared to normative data. Correlations between measures were then examined (all p-values < 0.05).

Results: Participants scored below average on all measures of EF. Significant correlations were observed between measures of shifting on NIHCT and measures of shifting on DKEFS [trails4 (r=0.593), category switching fluency (r=0.682)]. Working memory from NIHCT was significantly correlated with DKEFS category fluency (r=0.597) and color-word shifting (r=0.660). Inhibitory control from NIHCT

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was significantly correlated with DKEFS category switching fluency (r=0.681), but was not significantly correlated with DKEFS color-word inhibition scores. Self-report measures of EF, mood, and anxiety were elevated, but were not correlated with any neuropsychological measures of EF. Trait mindfulness, however, was correlated with shifting from DKEFS and working memory from NIHCT.
Conclusions: Findings suggest while some EF subtests from NIHCT correlate with similar measures of EF from the DKEFS, attention and inhibitory control measures do not appear to correlate. Further, mood and anxiety in SUD could not explain EF deficits on neuropsychological measures, providing support for EF as a unique contributing factor to SUD.
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R.E. ZIEMNIK, Y. SUCHY & M.A. NIERMEYER. The Deleterious Impact of Reported Expressive Suppression in Daily Life Persists at Future Testing in Community Dwelling Older Adults.
Objective: Expressive suppression (i.e., effortful suppression of behavioral expressions of emotion; ES) causes subsequent short-term decrements in executive functioning (EF) among older adults (Franchow & Suchy, 2017). Recent work shows that experimentally-induced ES prior to an EF task can interfere with the ability to benefit from exposure to that task, thereby negatively affecting future performance (Suchy, Niermeyer, Franchow, & Ziemnik, *under review*). The current study sought to examine whether this finding extends to naturally-occurring, self-reported ES.
Participants and Methods: Fifty-nine older adults (Mean Age = 69.9, *SD* = 5.1) completed items assessing burden of ES over the 24 hours leading up to testing, the Dementia Rating Scale, 2nd edition (DRS-2), and subtests from the Delis-Kaplan Executive Functioning System (D-KEFS), as indicators of EF. Six weeks later, participants returned to complete the D-KEFS a second time.
Results: Self-reported ES in the 24-hours leading up to baseline testing accounted for variance in EF composite scores at follow up above EF scores at baseline ($R^2 \Delta = .06$, $p = .001$). Self-reported ES also predicted the size of EF practice effects (i.e. the change in score from baseline to six-week follow-up) above age and DRS-2 ($R^2 \Delta = .20$, $p = .001$).
Conclusions: These results suggest that participants who report high ES in the 24 hours prior to testing exhibit a decrement in performance not only on the present test (as already demonstrated in previous research, Franchow & Suchy, 2015), but also at a 6-week follow-up. The current findings suggest that ES interferes not only with immediately following EF test performance, but also with the ability to benefit from task exposure, thereby decreasing the size of the expected practice effect during re-assessment.
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C.J. ZOLLIECOFFER, M.T. KASSEL & D.C. OSMON. Jensen Box Reaction Times Do Not Differ Using a Dedicated Chip Compared to a Computer Operating System.
Objective: Some have noted that a computer operating system adds significant error to the measurement of reaction time (RT; Leark et al., 2007). Additionally, others have argued that decision time and movement time should be measured spearately (Jensen, 2006; Ratcliff, 1979). Present results challenge those propositions.
Participants and Methods: Sixteen college participants completed eight RT tasks, four of which used the Jensen box format with a dedicated chip that did not have a separate operating system, and four of which used a traditional RT format without separating decision and movement time with a 'home' button.
Results: The 0-bit Jensen box decision time was different from the 1-bit, 2-bit, and 3-bit decision times by t-test and Wilcox Signed-Rank ($p<.02$); however, the 1-bit, 2-bit, and 3-bit decision times did not differ from each other ($p>.05$). In contrast, RTs of the computerized bit tasks all differed from each other ($p<.05$). Both the 0-bit and 1-bit tasks from the Jensen and computerized methods showed 32ms/bit and 37ms/bit differences in RT with longer RTs evident on the 1-bit task compared to the 0-bit. The computerized tasks showed a nonlinear increase in RTs from the 1-bit to both the executive functioning 1- and 2-bit tasks. The RTs did not differ by t-test or Wilcox Signed-Rank ($p>.05$) when comparing the comparable bit tasks between the Jensen and computer versions.
Conclusions: Results did not suggest that a computer operating system (Windows on a PC) distorted RTs in comparable 0-bit or 1-bit tasks even when averaging over 120 task trials. However, further investigation of the failure to replicate the approximately 30ms/bit increase in RT when progressing from the 1-bit to the 2-bit to the 3-bit Jensen tasks is warranted.
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A. ZWILLING, K.W. CARSON, S. BABAD & V. NIKULINA. Are there Age-Related Associations Between Adverse Childhood Experiences and Risk-Taking and Sensation Seeking in Emerging Adults?
Objective: The prefrontal cortex (PFC) continues to mature throughout emerging adulthood (ages 18- 25 years), which may account for decreased risk-taking and sensation seeking in the mid- to late-twenties. Extant research also suggests that adverse childhood experiences (ACEs) are associated with adult risk-taking and sensation seeking. The present study seeks to investigate whether the negative association between age and risk-taking and sensation seeking is weakened for those individuals who have experienced adversity in childhood.
Participants and Methods: Undergraduate students (M = 19.70, SD = 1.83, range [18,25]) participated in an online study conducted at an urban university in the Northeast (N = 436; 67% female; 22% Hispanic; 33% Asian). ACEs and decision-making were measured using the ACE Survey, Domain-Specific Risk-Taking Scale (DOSPERT), and the Behavior Inhibition/Approach Scales (BIS/BAS). Hierarchical linear regressions were run with subscales of risk-taking/sensation-seeking as outcomes, age as a predictor, and individual ACEs as moderators.
Results: In main effect findings, younger participants were more likely to engage in reward-seeking behaviors and individual ACEs (emotional abuse, physical neglect, living with a mentally ill family member) predicted more risk-taking and sensation seeking behaviors. A significant interaction emerged predicting DOSPERT ethical behaviors, such that younger individuals with a family member in prison (but not those without an incarcerated family member) were more likely to engage in risky ethical decisions.
Conclusions: Consistent with prior research, age is negatively associated with reward seeking behaviors. Additionally, these findings suggest that in this particular sample, having a family member in prison puts younger individuals at an increased risk for engaging in risky ethical decisions. This particular ACE may influence PFC development in emerging adults.
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Language and Speech Functions/Aphasia

V. BALASUBRAMANIAN. Is the Supra Marginal Gyrus a Hub for Orthographic Processing?
Objective: The involvement of the supra marginal gyrus (SMG) in speech production is well attested in contemporary research (Gunther & Hickok, 2016; Luria 1970). Contrary to this view, recent research has added new information about the role of SMG and inferior parietal lobe in several different processes and networks (Bikofski et al, 2017). For instance, recent studies strongly suggest that SMG plays a significant

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role in spelling/writing (Baldo etal, 2018), along with angular gyrus (AG), SMG underlies Spanish orthographic competence (Gonzalez-Garrido et al, (2017), and visual word processing (Stoeckel etal, 2009). In the context of these recent studies, the current study aims at answering the question 'Does the SMG serve as a hub for orthographic processing?'
Participants and Methods: The current study is a retrospective case study of an aphasic. The subject, CBH, is a 59-year-old female chronic aphasic with bilateral inferior parietal lobe lesion. CBH was tested on Boston Diagnostic Aphasia Examination (BDAE)and the Psycholinguistic Assessment of Language Performance in Aphasia (writing/spelling subtests of PALPA).
Results: CBH's spelling performance revealed impairments at the levels lexical-semantics, phoneme-grapheme conversion, orthographic output lexicon, and graphemic buffer.
Conclusions: CBH's spelling performance revealed impairments at the levels lexical-semantics, phoneme-grapheme conversion, orthographic output lexicon, and graphemic buffer.
The current case report offers support to the assertion that SMG plays a significant role in spelling/writing (Baldo et al, 2018; Gonzalez-Garrido, 2017). Other studies support the view that SMG also plays a significant role in phonological short-term memory, visual word processing, phonological planning (Luria, 197o), and grammatical processing (Schonberger et al, 2014). Taken together, these studies and the results from the current study appear to suggest that SMG probably serves as a hub pooling variety of information and serving both spoken and written forms of production.
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M.S. BARKER & G.A. ROBINSON. Spontaneous Speech and Cognition in Atypical Parkinsonism: A Case Series.
Objective: Reductions in spontaneous speech output have been documented in patients with the atypical Parkinsonian neurodegenerative disorder of progressive supranuclear palsy (PSP). Severely reduced spontaneous speech is the hallmark of dynamic aphasia: a rare language disorder that has been documented in the context of PSP. Recently, an impairment in the 'executive' attentional process of *energization* was reported to explain the paucity of spontaneous speech in a patient with dynamic aphasia and PSP. Energization is the process of initiating and sustaining a response, and is critical for maintaining output over time. The current study aimed to investigate the relationship between spontaneous speech and the process of energization in patients with PSP.
Participants and Methods: Patients with PSP ($N = 5$), patient controls with other neurodegenerative conditions (Alzheimer's disease $N = 3$, frontotemporal dementia $N = 2$) and healthy older adults ($N = 30$) were assessed on a set of neuropsychological tests, including attention, language and executive function tasks. Energization was investigated using samples of spontaneous speech and an experimental button-pressing concentration task.
Results: The spontaneous speech output of the subjects with PSP showed a clear pattern whereby speech rate decreased significantly after the initial time period, indicative of an energization deficit. On the experimental energization task, subjects with PSP showed a similar pattern such that responding slowed significantly after the initial time period. By contrast, the healthy and patient controls maintained consistent responding over time.
Conclusions: Overall, executive attentional mechanisms, such as energization, appear to play a key role in spontaneous speech production. Understanding how these underlying processes operate in healthy and pathological aging, such as in PSP, has theoretical and practical implications.
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J. BOVE, K. COUSINS, D. IRWIN, K. RASCOVSKY & M. GROSSMAN. Longitudinal Decline in Lexical Retrieval is Related to AD Pathology in Progressive Aphasia.
Objective: Primary progressive aphasia (PPA) is associated with impaired lexical retrieval, but the neuropathologic basis for this impairment is unclear. A primary feature of logopenic variant PPA (lvPPA) is impaired lexical retrieval, although naming difficulty is also impaired in semantic variant PPA (svPPA) and may also be impaired in nonfluent/agrammatic PPA (naPPA). lvPPA is thought to be associated with AD pathology, but this variant is the least reliable to identify. We related longitudinal change in Boston Naming Test (BNT) performance to microscopic pathology to improve identification of PPA with AD pathology.
Participants and Methods: Participants included 26 autopsy-confirmed PPA patients from the Penn Frontotemporal Degeneration Center. Individuals met published criteria for (lvPPA (n=2), naPPA (n=4), and svPPA (n=4); 16 PPA patients did not meet formal criteria. Lexical retrieval was assessed longitudinally on abbreviated versions of BNT; we used these scores to calculate percent correct. At autopsy 13 patients had AD pathology and 13 had non-AD pathology; pathology severity was graded on a traditional 4-point scale. A mixed effects model assessed interaction between pathology and longitudinal BNT accuracy, correcting for education.
Results: BNT accuracy at baseline (t=0.43; p=0.66) and longitudinal testing duration (t=-0.64; p=0.52) did not differ between pathology groups. A mixed effects model showed a significant interaction between BNT decline and pathology: PPA with AD pathology had a faster rate of decline in BNT accuracy compared to PPA without AD pathology (p=0.01).
Conclusions: In this preliminary analysis, BNT scores declined significantly faster in PPA patients with AD pathology. Combined with our earlier study relating digit span to AD pathology, more rapid BNT decline could be a marker for AD pathology in PPA.
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J. CONNIFF, M. LANG, V.L. TORRES, I. VELEZ-URIBE, F. ARRUDA, D. CHRISTOPHER, M. ROSSELLI & A. ARDILA. A comparison in eye movements between two orthographic systems: English and Spanish.
Objective: To analyze eye movements, the count, and duration of fixations while reading in two different orthographic systems: Spanish (regular) and English (irregular) in a sample of English monolinguals and Spanish/English bilinguals.
Participants and Methods: Forty-one bilinguals and fifty-four monolinguals with an average age of 21.12 years (*SD*= 3.64) and an average of 14.49 years of education (*SD*= 2.55) were included. Language acquisition and history of bilingualism questionnaires were used. Two paragraphs were presented to monolinguals and four to bilinguals; two of which were in Spanish. One short paragraph (173 words) corresponded to elementary level reading, and a long paragraph (251 words) to more complex literary narratives. Tobii T60XL Eye-tracker and Studio Pro software recorded and analyzed the fixation count, mean fixation duration, and reading time. Participants answered comprehension questions after reading.
Results: In reading English, there were no significant differences between the two groups across the short and long texts for fixation and reading time. Significant differences (*ps*< .001) were found in all measures of fixation count sum, mean fixation duration, total fixation duration, and reading time when comparing reading in Spanish and English for bilingual participants in both texts.
Conclusions: Results suggest that when reading with increased fixations, smaller segments were scanned when reading in Spanish than in English. Previous research has found that reading strategies vary in different orthographic systems; Spanish is considered a strongly "syllable-timed" regular language, whereas English is a "stress-timed"

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irregular language. Thus, it could be proposed that reading in Spanish favors syllabic reading, while reading in English favors morphemic reading. Also, bilinguals did not show differences from monolinguals in eye movements while reading English. These results imply that reading in different orthographic systems can present distinct visual attention and cognitive processing.

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C. GARCÍA-SÁNCHEZ, G. KULISEVSKY PLAZA & T. NUÑEZ DOLADÉ. Singing can improve verbal fluency and semantic memory in persons with aphasia.

Objective: Music therapy has showed benefits for different cognitve functions, we want to know if people with aphasia can improve their verbal fluency and semantic memory by singing songs.

Participants and Methods: Twenty-nine people with aphasia who were members of the the choir of aphasia "Canta Sant Pau" were evaluated with two verbal fluency tasks: semantic (actions) and one phonemic (the letter. P) fluency and with a semantic memory task (Kissing and Dancing test (KDT)), before and after singing for 20 minutes (two times a week) for 16 sessions. They sang two songs with lots of verbs (50 verbs each song). The songs were created for the study and every song only has verbs inside its lyrics. The lyrics played with different verbs from letter A to Z and synonyms. The phonemic fluency was used to control the possible learning.

The patients were evaluated by a speech therapist and neuropsychologist and the treatment was carried out by a musictherapist.

Results: After treatment, the persons with aphasia composited for 14 men and 15 women; (61,24 ±12,9 years old) showed a significant improvement for action fluency (5,4±1,2; 6,7±1,2) and semantic memory (43,5 ±5,8; 46,6± 4,3). No significant changes were found in the phonemic fluency.

Conclusions: This study suggests that music therapy is effective in enhancing verbal fluency and semantic memory and can be recommended as a treatment alternative or complementary to manage people with aphasia.

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R. GERRITS, L. LAGAE, S. SUNAERT, R. PEETERS, I. ZINK, N. ROMMEL & M. VERLY. Childhood Rolandic Epilepsy Pairs with Abnormal Lateralization in Perisylvian and Cerebellar Language Regions.

Objective: Most language functions are relatively lateralized to the left hemisphere. Evidence suggests that laterality is disturbed in frontal language regions of patients with Rolandic epilepsy (RE), which is the most common focal epilepsy of childhood. Despite being often considered benign, RE is increasingly associated with mild to severe cognitive and language impairment. The aim of this study is to expand prior research on language dominance in RE by investigating laterality in multiple components of the language network.

Participants and Methods: Sixteen children with RE (mean age: 10;07 years, 10 males, 10 right-handers) and 23 typically developing controls (mean age: 11 years, 15 males, 14 right-handers) matched for age, gender and handedness performed a verbal fluency fMRI task. For each participant, laterality indices (LI) were computed within Broca's area (BA), Wernicke's area (WA) and Cerebellum Crus I (CC I) using the formula: (left activity – right activity) / (left activity + right activity).

Results: While children with RE and controls did not differ in terms of presence of left or right language dominance for any of the ROIs, we did reveal that children with RE have significantly lower strength of laterality in BA ($p=0.003$) and CC I ($p=0.008$). Moreover, the LI's of the different ROIs did not correlate significantly with one another in RE (BA and CC I: $r=-0.10$, $p = 0.722$; WA and CC I: $r=-0.09$, $p=0.736$; BA and WA: $r=0.25$, $p=0.349$), whereas in controls, we found a clear negative association between the LI's in BA and CC I ($r=-0.81$, $p<0.001$) and WA and CC I ($r=-0.54$, $p=0.007$) as well as a positive correlation between the LI's in BA and WA ($r=0.63$, $p<0.001$).

Conclusions: Rolandic epilepsy reduces strength, but does not affect direction, of language dominance. It further disturbs the coherence of laterality between multiple components of the language network, including in the CC I, despite its distal location from the site of seizure onset.

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R. GERRITS, M. VERLY, C. MENDEZ-ORELLANA, P. KOUDSTAAL, A. VAN DER LUGT, E. VISCH-BRINK & M. SMITS. Does Right Hemisphere White Matter Integrity Predict Language Performance in Chronic Aphasia?

Objective: This study investigates whether white matter integrity of right hemispheric homotopic language tracts predicts language performance in patients with chronic aphasia due to left hemisphere stroke.

Participants and Methods: Thirty-one patients with chronic aphasia (>1 year post-stroke) due to unilateral left hemisphere stroke completed a language test battery (10 tests) and a DTI scan. Five language-related tracts were manually delineated using ExploreDTI: superior longitudinal (SLF), middle longitudinal, inferior longitudinal, uncincate and inferior fronto-occipital fascicle. The SLF was further segmented into an anterior, longitudinal (SLF-Long) and posterior part. For each tract, white matter integrity was assessed by computing the fractional anisotropy (FA). Next, the FA values were used alongside lesion volume to predict language performance. A model building strategy was used to evaluate which combination of predictors resulted in the best predictability. To deal with multicollinearity, a partial least squares regression (PLSR) framework was used. Model performance was evaluated using symmetric mean absolute percentage errors (sMAPE) obtained via leave-one-out cross-validation. Lower values of sMAPE indicate lower prediction errors and hence better model performance.

Results: For 5 language tests, the model consisting of lesion volume only best predicted performance (sMAPE range: 11 to 37%). For the remaining tests, additionally including FA slightly increased model performance (sMAPE decrease up to 4.5%). Overall, the SLF-Long contributed the most to model predictability among the tracts.

Conclusions: This study shows that including FA of homologue "language-related" tracts in the right hemisphere alongside lesion volume slightly boosts predictability of language performance in patients with chronic aphasia. This could either reflect homotopic language reorganization in the right hemisphere or indicate that a-priori stronger developed right hemisphere tracts reduce severity of post-stroke language impairment.

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M. HUHTALA, E. O'CONNOR DERIKOZIS, A.M. O'BRIEN & J.E. CASEY. The Association of Working Memory and Word Knowledge to the Phonological Awareness Subtests of the CTOPP-2.

Objective: Although the Elision (EL), Blending Words (BW), and Phoneme Isolation (PI) subtests factor together to form the CTOPP-2 Phonological Awareness (PA) Composite, no study has investigated the extent to which certain linguistic abilities relate to each of the subtests. Since no neuropsychological test comprises a single cognitive construct, it is essential for informed interpretation that the latent cognitive abilities associated with a measure are understood. The present study examined the relation between each PA subtest with the linguistic abilities of auditory working memory and word knowledge. Literature suggests auditory working memory contributes to reading ability in addition to PA (Kibby et al., 2014). The present study extended previous findings by examining the extent to which such abilities contribute to performance on each of the PA Composite subtests.

Participants and Methods: Participants (N=129) aged 6-18 (M_{age}= 9.9 years) included a clinical sample of children referred for neuropsychological assessment (n=38) and a community sample recruited for a larger research study (n=91). Participants were administered select subtests from the CTOPP-2, including (EL), Blending Words (BW), and Phoneme Isolation (PI), along with select subtests from the WISC-V, including Digit Span (DS) and Vocabulary (VC).
Results: Multiple regression analyses revealed that auditory working memory was a significant predictor of performance on EL (b = 0.50, $p < .001$), BW (b = 0.32, $p < .001$), and PI (b = 0.26, $p = .006$) subtests. Although language ability was also a significant predictor for EL (b = 0.17, $p = .03$) and BW (b = 0.23, $p = .008$), it only accounted for less than 25% of the explained variance. Language ability did not predict PI.
Conclusions: Results suggest that auditory working memory significantly contributes to performance on EL, BW and PI. That language ability did not contribute significantly to PI suggests it places greater emphasis on working memory.
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J. MCCULLAGH, R. ZIPOLI, H. MAGLIANO, L. MISENCIK, K. GAUTHIER, M. NAWALANIEC & R. SPADORY. Interdisciplinary Assessments of Central Auditory Processing, Phonological Processing, and Reading Abilities in Children.
Objective: Converging evidence supports relationships between central auditory processing (CAP), phonological processing (PP), and reading abilities. However, clinicians in the fields of audiology, speech-language pathology, and neuropsychology currently lack empirically-validated test batteries that evaluate these complex abilities in a comprehensive and integrated manner. The purposes of this study were to: (a) delineate when cross-disciplinary referrals are indicated; (b) determine how to integrate assessment findings from related disciplines in a systematic and clinically relevant manner; and (c) clarify the specific nature of relationships between central auditory processing (CAP), phonological processing (PP), and reading abilities.
Participants and Methods: Participants included 18 children between the ages of 7 and 12 who had concerns regarding CAP, PP and/or reading abilities. Participants had negative neurological histories and cognitive abilities within the average range, as measured by the Test of Nonverbal Intelligence-4. All participants had comprehensive audiological and CAP (Dichotic Digits, Competing Sentences, Words-in-Noise, Frequency Patterns, and Gaps-in-Noise tests) evaluations. Participants had assessments of their PP and reading skills (Comprehensive Test of Phonological Processing-2 subtests, Woodcock Reading Mastery Test–3 subtests, Test of Word Reading Efficiency–2, and Gray Oral Reading Test–5). Pearson product moment correlations were conducted.
Results: Significant correlations existed between CAP Frequency Patterns and tests of PP. No other significant correlations existed.
Conclusions: These results are generally consistent with previous findings, but in contrast to previous results, no significant relationships existed between the Gaps-in-Noise test and tests of PP and reading. This information adds to the evidence base for professionals who evaluate and treat children with CAP, PP, and reading disorders.
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S. SHARMA, H. KIM, C. ELLIS & H.H. WRIGHT. Modelling Narrative and Procedural Discourse Performance in Aphasia.
Objective: Core lexicon analysis provides an alternative approach to more time-intensive, lexical-level discourse analyses. Thus, the aim of this study was to investigate the magnitude and relationship among the core lexicon lists and two discourse elicitation tasks across two groups (Fluent aphasia vs. Non-fluent aphasia).
Participants and Methods: Language samples from 262 participants were retrieved form AphasiaBank: 87 participants with non-fluent aphasia (PWN) and 175 participants with fluent aphasia (PWF). The discourse tasks included a picture description narrative task and a procedural discourse task. For the single picture description task (Cat in tree), the participants explained what happened in the picture provided. For the procedural discourse task, the participants told the steps to make a peanut butter and jelly sandwich. From the transcribed samples, the core lexicon list i.e. nouns, verbs, adjectives, and adverbs were extracted for both the tasks i.e. *cat* and *sandwich*. Structural equation modelling (SEM) was applied to analyze the data using R.
Results: Preliminary results indicated that the magnitude of relationship between procedural discourse and narrative discourse was .83 for PWF and .70 for PWN. These covariance estimates indicate that higher scores on procedural discourse reflect better performance on narrative discourse. Consequently, covariances between the two latent variables for both groups were considerably related. The magnitude of core verbs' relationship with the latent factor for both groups was the largest compared to core nouns, adjectives, and adverbs. That is, core verbs were the strongest indicator of performance on the discourse elicitation tasks for both groups.
Conclusions: The findings suggest that lexical access is similarly captured regardless of discourse task in adults with aphasia. Theoretical and clinical implications are discussed.
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L. WOLFF & J. BENGE. Everyday Language Difficulties in Parkinson's Disease: Caregiver Description and Relationship with Cognition, Activities of Daily Living, and Motor Disability.
Objective: Individuals with Parkinson's disease (PD) identify language and communication difficulties as common and troubling. To date, the stage of cognitive impairment when everyday language problems become noticeable and our ability to identify individuals with these problems using clinical instruments has yet to be explored. The purpose of this study is to characterize caregiver reported linguistic difficulties in persons with PD, and to evaluate the MoCA as a screening tool for identifying those with such problems.
Participants and Methods: The sample consisted of 42 community-dwelling individuals with PD and their caregivers. Participants were administered the Montreal Cognitive Assessment (MoCA) while the informants completed The Everyday Cognition (ECog) scale.
Results: Caregivers noted more everyday language difficulties (ELD) in the dementia group relative to the MCI and normal cognition groups (H= 14.37, df(2), p=0.0008) and this relationship held for each of the items assessed. Using an ECog cut-point of 3, 48% of caregivers noticed at least one ELD. ELDs were more common in those with dementia ($\chi^2 = 9.53$, p = 0.009), but were also described in 40% of those MCI and 30% of those with normal cognition. The presence and degree of ELDs correlated with total score on the MoCA, but not the individual language items.
Conclusions: Caregivers report an array of ELDs in PD that increase with overall cognitive decline. ELDs are very common in dementia, but are even noticed in about 30% of individuals without measurable cognitive impairment. Low MoCA scores are associated with more frequent ELDs, but performance on language items does not seem to be related to these symptoms. More work is needed to develop screening measures that are sensitive to ELD in PD and to understand their etiology and possible treatments.
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Memory Functions/Amnesia

L.P. CRESPO, S. SILVERSTEIN & M. ERICKSON. Alpha Desynchronization is Impacted by Individual Grouping Strategies in Visual Working Memory Task.

Objective: Visual working memory (WM) capacity is commonly measured using the change detection paradigm (Luck & Vogel, 1997). Recently, it has been reported that desynchronization of alpha (9-13 Hz) within the EEG during the delay period of a change detection task is associated with WM capacity (Fukuda et al., 2015; Erickson et al., under review). However, it is unclear whether alpha desynchronization is associated with the number of objects in memory or with the number of groups of objects. It is known that individuals can enhance their WM capacity by grouping objects with identical color properties (Petersen et al., 2013). In the present study, we examined (1) how much individual variability can be observed in the use of grouping strategy when presented with memory arrays of objects with similar colors, and (2) to what degree alpha desynchronization is associated with the total number of objects vs. number of grouped objects stored in memory.

Participants and Methods: In Experiment 1, 27 healthy individuals completed a change detection task in which they were asked to remember the colors from two types of visual arrays: one in which items could be easily grouped by color (same color family) and one in which items could not (different color family). In Experiment 2, we have collected EEG data from healthy participants while they complete a change detection task similar to that described in Experiment 1 (N=6).

Results: We found that WM capacity estimates were significantly higher for conditions that facilitated grouping by color, and that there was substantial variability in participants' use of grouping cues to enhance performance. Preliminary results also indicate that alpha desynchronization appears to be associated with the number of object groups in the array, rather than the total number of individual items stored.

Conclusions: Such findings have important implications for understanding the relationship between electrophysiological indices of WM and individual differences in storage strategy.

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F. FALZARANO & K.L. SIEDLECKI. Investigating the Relationship between Socialization and Memory as Mediated by Health and Positive Affect.

Objective: Decreased social networks are common in old age after major life events such as retirement, loss of loved ones, and declining health (Shankar, Hamer, McMunn, & Steptoe, 2013). Diminished social ties are also associated with increased feelings of loneliness and perceived isolation, which can have negative effects on individuals' neurocognitive and physical health (O'lunaigh & Lawlor, 2008; Zunzunegui, Alvarado, Del Ser, & Otero, 2003). The goals of the current study were to examine health and positive affect as mediators for the relationship between feelings associated with socialization and memory performance.

Participants and Methods: Data from 18,748 participants between the ages of 50-104 years from the 2014 wave of the Health and Retirement Study were used to examine the relationship between socialization (as measured via 4 items related to negative feelings of socializing) and memory (assessed via immediate and delayed free recall). Self-rated health and positive affect were examined as mediators using structural equation modeling.

Results: Health and positive affect individually and jointly mediated the relationship between negative feelings of socialization and memory performance. A joint mediation model fit the data well: $c^2 = 2898.71$, $df = 96$, $c^2/df = 30.19$, CFI = .932, RMSEA = .039. The relationship between socialization and memory was reduced from -.25 to a nonsignificant relationship of -.08. Thus, the relationship between socialization and memory is almost entirely mediated by health. Positive affect was no longer a significant predictor of memory performance in this model.

Conclusions: Self-rated health and positive affect help explain the relationship between socialization and memory performance, and findings reveal further insight into ways in which negative feelings associated with socialization may negatively influence memory in older adults.

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M.M. HADDAD & A.Y. STRINGER. A Case Study of Circumscribed Recognition Memory Deficit in Multiple System Atrophy.

Objective: Recognition is a subtype of memory retrieval that involves making familiarity judgments. Although recognition memory has long been included in neuropsychological assessment batteries, the functional neuroanatomy underlying this skill remains relatively unknown. In particular, little is known about the etiology of recognition deficits when free recall performance is comparatively intact. The literature that does exist has suggested that false recognition may involve lesions to the frontal lobe or parahippocampal gyrus (Schacter & Slotnick, 2004). Here we present a case study of circumscribed recognition memory deficit in a patient with Multiple System Atrophy (MSA), a condition whose unique anatomical and cognitive profile continues to be a subject of investigation (Stankovic et al., 2014).

Participants and Methods: K.H., a 61-year-old, right handed, Caucasian male, with a 3-year history of dysautonomia and cognitive dysfunction leading to the diagnosis of likely MSA. K.H. was administered a full neuropsychological battery, as well as follow-up testing 6 months later.

Results: K.H. demonstrated deficits in attention, memory, and executive functions. The most notable finding in both evaluations was the consistent pattern of severely impaired recognition performance in the context of relatively intact free recall. Neuroimaging during the course of his condition indicates diffuse microvascular disease and mild frontal atrophy.

Conclusions: K.H.'s performance is a demonstration of stable, circumscribed recognition memory deficit with relative sparing of recall in a case of MSA. Implications for the anatomy of MSA and use of recognition memory paradigms in neuropsychological assessment are discussed.

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J. KAYLEGIAN, C. NANCE & J.B. MILLER. Fatigue and Memory in a Geriatric Clinic Population.

Objective: Fatigue has been shown to influence cognition and memory, especially in older adults. The present study investigated fatigue in an older adult population and its relationship with performance on memory tasks.

Participants and Methods: Participants include 439 adults seen in a geriatric clinic for a neuropsychological assessment (mean age = 71.5 years; education = 14.5 years, 53% Male; 89% Caucasian) that completed a comprehensive assessment in the course of routine clinical care. Logical Memory (LM) from the WMS-IV, Hopkins Verbal Learning Test, Revised (HVLT-R) and Brief Visuospatial Memory Test, Revised (BVMT-R) were used as primary memory scales. Fatigue was measured with the Fatigue Severity Scale (FSS), a nine questions self-report questionnaire. Participants were separated into groups based on their FSS scores, low (>1 SD below the mean), medium (+/- 1 SD), and high (>1 SD above the mean) fatigue. Partial correlations adjusting for age and education were used to assess relationships between fatigue and memory using immediate and delayed recall, and recognition scores, and the total score from the FSS.

Results: Total FSS score was positively correlated with LM Immediate (.134), LM Delayed Recall (.176), HVLT Trial 2 (.143), HVLT Trial 3 (.136), HVLT Delayed Recall (.153), BVMT Trial 2 (.130), BVMT Trial 3 (.131), BVMT Delayed Recall (.135). Fatigue severity groups

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were positively correlated with, LM1 (.111), LM2 (.138), HVLT Trial 2 (.113), HVLT Trial 3 (.112), HVLT Delayed Recall (.113), BVMT Trial 2 (.133), BVMT Trial 3 (.114), BVMT Delayed Recall (.117). Among the memory variables tested, only the first learning trial of the HVLT and BVMT did not produce a significant association with fatigue.
Conclusions: Understanding the source of declining cognitive function in an aging population is an immense task. The results of this study provide evidence that fatigue has the potential to impact an individual's memory performance, elucidating the importance of collecting fatigue data at the time of assessment.
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S. LARVOR. Generalized Dissociative Amnesia Associated with a Semantic Prosopagnosia: A Case Report.
Objective: Dissociative amnesia is a psychiatric disorder defined by a loss of autobiographical information, usually associated with a traumatic event. Generalized dissociative amnesia is rare and characterized by a retrograde amnesia that concern identity and entire lifespan.
Participants and Methods: We report a case of a 46 year-old man who came spontaneously to the hospital. He did not know his name and had no identity paper with him. No mark of aggression or injury was observed and his physical examination was normal. Brain CT scan, Cerebral MRI and MR-angiography were normal as well as FDG Positron Emission Tomography. Basic laboratory testing was normal, as well as urine drug screening and analysis of cerebrospinal fluid (CSF) including Alzheimer biomarkers. Clinical neurological examination, extensive work-up and psychiatric consultation supported the diagnosis of dissociative amnesia, which happened in a context of split-up with his wife and his children. Neuropsychological assessment confirmed the diagnosis of generalized dissociative amnesia.
On exploring cognitive functions we observed that his anterograde episodic memory was intact. Examination of praxis, visuoconstructive abilities and executive functions were all normal. General semantic knowledge appeared also to be preserved. When presenting faces of celebrities, a semantic prosopagnosia on both modalities was detected: faces pictures and names.
Results: The patient was able to learn new information and could relearn names. Months after, this helped him in adapting himself in society despite the fact that he did not recover and still presents a retrograde amnesia.
Conclusions: Our study underlines the importance of neuropsychological examination on dissociative amnesia and brings information about implication of emotions on semantic memory and episodic memory. We explain this dissociation by the fact that public celebrities take a place in construction of identity, with a higher implication on emotion than general semantic knowledge.
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E.A. LEHTO, M. VIRTA, S. IMMONEN, I. JÄRVINEN, N. SCHIAVONE, K. MICHELSSON, J. LAUNES & L. HOKKANEN. Prospective Memory Performance in Adults with a History of Prenatal Hyperglycaemia.
Objective: Maternal diabetes mellitus in pregnancy has been linked to impairments in memory functions of the offspring. However, study results are controversial and few studies have followed the effects into adulthood. The association of prenatal hyperglycaemia with prospective memory (PM) performance and the predictors of PM performance of the offspring of diabetic mothers (ODM) have not previously been studied in adulthood. Executive functions and episodic memory have been suggested to predict event-based prospective memory (EBPM) and time-based prospective memory (TMPM). The present study assessed executive functions, episodic memory and working memory as predictors of both EBPM and TBPM performance in adults with a history of prenatal hyperglycaemia.
Participants and Methods: Participants are part of a birth-risk cohort born in 1971–1974, studied since birth: ODM group (n =31) and healthy controls (n =82). Both EBPM and TBPM performance were assessed using the new Finnish Proper Prospective Memory Test (PROPS), which includes both laboratory and naturalistic tasks. Executive functions, episodic memory and working memory were assessed using neuropsychological tests (TMT, Stroop, verbal fluency task, WAIS-IV, WMS-III and ROCFT). The data was analysed using ANCOVA and linear multiple regression analysis.
Results: Adjusted for age, sex and education, the ODM group did not differ significantly from the controls in PM performance. Executive functions, episodic memory and working memory predicted 17 % of the variance ($p < .05$) in EBPM performance of ODM in adulthood. Episodic memory explained 18 % of the variance ($p < .01$) in TBPM performance of ODM in adulthood.
Conclusions: Prenatal hyperglycaemia was not associated with impaired prospective memory in adulthood. The variation in PM performance was partially explained by other cognitive domains. Executive functions, episodic memory and working memory were associated with EBPM. Episodic memory was linked with TBPM performance.
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M.B. MEMEL, A.A. WANK, L. RYAN & M. GRILLI. The Relationship Between Episodic Autobiographical Memory Detail Generation and the Integrity of MTL-Cortical White Matter Pathways in Cognitively Normal Older Adults.
Objective: Episodic autobiographical memories, our memories for specific, personal events, contain a combination of episodic details and semantic details. Episodic detail generation is believed to arise from hippocampal-cortical interaction. To provide evidence relevant to this idea, we investigated the relationship of episodic detail generation to microstructural integrity of white matter tracts connecting the medial temporal lobe (MTL) to the cortex in a group of cognitively normal older adults.
Participants and Methods: Twenty-nine older adults, who within six months took part in an abbreviated version of the Autobiographical Interview (AI; Levine et al., 2002) and an MRI scan occurring at the University of Arizona, were included in this study. As part of the MRI scan, structural MRI and high angular diffusion weighted imaging data were collected. A region of interest approach was utilized to identify the fornix, uncinate fasciculus (UF), and parahippocampal portion of the cingulum (PHC), and for each tract we calculated two measures of white matter integrity (fractional anisotropy and mean diffusivity). The abbreviated AI (i.e., three memories) was scored for episodic and non-episodic detail generation using the standard AI protocol. Tract-specific measures of white matter integrity were correlated with the total number of episodic details generated and with two content specific sub-composites of episodic details: "core event" details and "spatiotemporal context" details.
Results: Greater white matter integrity of the fornix was associated with greater total generation of episodic details, and both core event and spatiotemporal context detail sub-composites. UF was related to core event details, whereas PHC was weakly related to episodic details overall.
Conclusions: These findings indicate that relative to other MTL-cortical pathways, hippocampal-cortical interaction via the fornix is particularly important for episodic specificity among older adults.
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C.O. NESTER, C. MALONE, A. COUTO & M. O'CONNOR. Memory for Transient News Events in Relation to Age and Dementia.

Objective: Memory for transient news events (e.g., Joey Buttafucco) adhere to different forgetting curves than memory for news items that persist over prolonged time periods (e.g., Princess Diana) and they may be more sensitive to incipient dementia. Such events may be differentially affected by deficits in language versus episodic memory. In the current study, we use an updated version of the Transient News Events Test (TNET) to examine these issues. We expect that people with dementia will show reduced recall for recent items and that extent of impairment will be associated with severity of dementia, as well as language and episodic memory deficits.

Participants and Methods: The TNET was administered to 67 people in a neurology clinic. All underwent comprehensive neuropsychological evaluations, including tests of memory and language functions. Forty-six participants had cognitive impairment (CI; age M = 72.5) and 21 had no cognitive impairment (NCI; age M = 68.2). Pre-study piloting yielded nine transient items spanning the years 2000-2016. Free recall and forced choice recognition were examined in relation to severity and pattern of dementia.

Results: NCI adults (M=30.6) demonstrated significantly better memory for transient events than CI participants (M=22.9); $t(73)=2.872$, $p=.005$. TNET total score in NCI was significantly correlated with WMS Logical Memory II (LM II; $r(18)=.541$, $p<.05$), but not with Boston Naming Test (BNT; $r(18)=.391$, *ns*). However, in the CI group, the total score was significantly correlated with LM II ($r(36)=.372$, $p<.05$) and with BNT ($r(37)=.366$, $p<.05$).

Conclusions: Results reveal distinct cognitive functions may underlie recall between groups: the NCI group appeared to rely on episodic memory when identifying news events, while the CI group relied on episodic and semantic memory. This study demonstrates that structured measurement of memory for news events may confer diagnostic information not captured by standard neuropsychological evaluations or informal assessment of memory.

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M.R. PASTER, M.A. PARRA, D. SALMON & D.M. JACOBS. Short-Term Memory Binding and Semantic Network Strength Reinforce Prospective Memory in Older Adults.

Objective: Prospective memory (Pro-M), or remembering to carry out a future task, is critical to everyday functioning. The cognitive substrates of Pro-M, however, are unknown, and it is not clear whether age-associated Pro-M failures are due to deficient attention, episodic memory, time sense, associative binding ability, etc. We investigated the neurocognitive mechanisms underlying Pro-M in older adults.

Participants and Methods: 48 non-demented older adults (M age=75.2; SD=2.1) were recruited from the UCSD Alzheimer's Disease Research Center. Participants were evaluated with the Memory for Intentions Screening Test (MIST; Raskin et al., 2010), an experimental visual short-term memory (STM) binding task (Parra et al., 2017), and a test battery that included measures of episodic memory, attention, executive function, and language. Correlational analyses were used to examine associations among the cognitive measures.

Results: Overall performance on the MIST was significantly correlated with shape-color binding accuracy ($r=0.38$; $p<0.05$) and Animal Fluency ($r=0.29$; $p<0.05$), but was not associated with traditional tests of episodic memory, attention, or executive functioning (all p values > 0.10). Analysis of errors on MIST time-cued tasks revealed the most common error was performing an incorrect task at the prescribed time (61%), whereas performing the prescribed task at the incorrect time was relatively infrequent (13%).

Conclusions: Pro-M ability in non-demented older adults was associated with STM binding and category fluency but not episodic memory, attention, or executive functioning. Results suggest that Pro-M is a unique aspect of memory functioning that is distinct from episodic memory and requires synthesizing multiple cognitive strategies. Participants with better semantic organization may be able to create a stronger association for the intention at the time of encoding, while Pro-M failures could be explained by a failure to adequately bind the semantic components of the encoded intention with the future action.

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S. SIMONE, L.V. GRAVES, M. WILLIAMS, S. MATTSON, L. DELANO-WOOD, M. BONDI, D. SALMON, J. COREY-BLOOM, D. DELIS & P. GILBERT. Total Recognition Discriminability in Huntington's and Alzheimer's Disease: New Insights from the CVLT-3.

Objective: The original and second editions of the California Verbal Learning Test (CVLT) used nonparametric and parametric methods, respectively, to assess Total Recognition Discriminability (RD). In a previous study, we found evidence that the nonparametric formula may be more sensitive than the parametric formula to high false positive rates (e.g., in Alzheimer's disease [AD]) and therefore may provide a more sensitive measure of yes/no recognition. In the present study, we compared performance on CVLT-3 nonparametric and parametric Total RD indices in patients with Huntington's disease (HD) or AD in mild and moderate stages of dementia.

Participants and Methods: Study participants included 39 HD-mild, 16 HD-moderate, 25 AD-mild, and 27 AD-moderate individuals (DRS/DRS-2 scores were used to determine dementia severity). Raw and scaled scores on CVLT-3 nonparametric and parametric Total RD indices were generated and examined via analysis of variance/covariance.

Results: There was a significant effect of group on Total RD raw scores, controlling for age (*p*s<.001). Post-hoc tests with Bonferroni adjustments ($a_{BC}=.008$) indicated that the HD-mild group had significantly higher raw scores than the AD-mild and AD-mod groups on both indices, and the HD-mod group had significantly higher raw scores than the AD-mod group on the nonparametric index. There was also a significant effect of group on Total RD scaled scores (*p*s<.05). The HD-mild group had significantly higher scaled scores than the AD-mild and AD-mod groups on the nonparametric index, but performed better than only the AD-mod group (not the AD-mild group) on the parametric index.

Conclusions: As expected, CVLT-3 Yes/No Recognition performance was higher in HD than in AD. However, group differences were more robust on the nonparametric versus parametric Total RD index. The present results bolster our previous findings and highlight the utility of assessing both nonparametric and parametric measures of Total RD, which are now included on the CVLT-3.

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A. TART-ZELVIN & B. MAKWANA. Rehearsal Strategy Serves as a Normatively Effective Strategy on a Working Memory Task.

Objective: Rehearsal strategy (RS) is useful in managing the demands of working memory (WM) tasks (Turley-Ames & Whitefield, 2003; Klingberg, Forssberg, & Westerberg, 2002; Klingberg et al., 2005). Demographic variables, such as age and gender, have been shown to significantly impact WM performance and the use of cognitive strategies (Heinzel et al., 2014; Backman & Nyberg, 2013; Miyake et al., 2013). While differences in performance are likely the result of various factors, a strategy that is equally effective for all individuals is ideal. Thus, we examined if the use of RS on the free recall trial of a modified Operation Span task (M-OSPAN), a WM task, was significantly improved by RS and affected by age, education, or gender. We hypothesized that the younger and more educated participants would display better performance. Extant literature is mixed regarding the effects of gender on such tasks.

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Participants and Methods: Forty right-handed healthy community-dwelling residents of Salt Lake City participated. Participants aged 25-47 years ($M = 34.57$, $SD = 7.19$; 21 males) and reported 12-22 years of education ($M = 15.92$, $SD = 2.55$). Twenty participants were randomly selected to receive training in RS (experimental group; EG) and the other half did not receive strategy training (control group; CG). Participants then completed the M-OSPAN and a short demographic questionnaire.
Results: The CG scored a mean of 6.95 ± 4.11 and the EG scored a mean 11.77 ± 6.08 on the free recall trial. Free recall performance was not correlated with gender, age, or years of education in the CG ($p = 0.56$, 0.33, 0.24) or EG ($p = 0.52$, 0.46, 0.43). The experimental group significantly outperformed the control group on free recall, ($t(38) = -2.94$, $p = .006$).
Conclusions: The use of RS improved free recall on a WM task. Importantly, the use of this strategy was not significantly affected by age, education, or gender. Consequently, the present study provided further support evidencing rehearsal strategy as a normatively effective strategy.
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A.A. WANK, S. MOSELEY, A.J. POLSINELLI, L. MANN, M. MEHL & M. GRILLI. From Laboratory to Real-World: Measuring Autobiographical Memory Retrieval in Naturalistic Settings Replicates Laboratory-Based Findings.
Objective: Autobiographical memory (AM) interviews allow us to study the complex recollection of "real-life" events in a controlled laboratory setting. Such research has revealed that AM alteration is characteristic of many neuropsychological populations. The ability to capture AMs in everyday life would create opportunities to evaluate how AM manifests in naturalistic contexts and evaluate the validity of in-lab/clinic AM assessments. The Electronically Activated Recorder (EAR; Mehl et al., 2001) is a promising candidate to study these everyday AMs. Participants wear the EAR while it samples 30-second blocks of ambient noise, including conversation, from their environment. The aim of the present study was to examine the content of participants' AMs detected by the EAR to shed light on the ecological validity of AM laboratory findings.
Participants and Methods: Secondary data analysis of AMs was conducted on a sample of 94 cognitively normal older adults who wore the EAR. A scoring procedure adapted from Grilli and Verfaellie (2016) was used to identify episodic/episodic-like and semantic details within the content captured by the EAR. We analyzed relations between the degree of episodic/episodic-like specificity and demographic, neuropsychological, and psychological factors.
Results: Null hypothesis significance testing and Bayesian analyses revealed that, similar to lab-based AM interviews, naturalistic AMs contained mostly episodic/episodic-like details. Further, there was a small, positive correlation between episodic specificity and working memory (Addis, Wong, & Schacter, 2008), and women showed higher episodic specificity compared to men (Pillemer et al., 2003).
Conclusions: Aspects of AMs gathered in naturalistic settings using the EAR replicate some findings presented in the laboratory-based AM literature. Clinically, our results support the use of AM tasks as measures of real-world cognitive functioning. We also suggest that the EAR could be a useful research tool for better understanding AM content in everyday life.
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A.A. WANK & M. GRILLI. Relationship of Inhibition Ability to Early Versus Later Stages of Episodic Autobiographical Memory Retrieval in Cognitively Normal Older Adults.
Objective: Over-general autobiographical memory is associated with normal cognitive aging such that relative to young adults, older adults are less likely to retrieve episodic autobiographical memories (EAMs) and show lower episodic specificity during EAM elaboration. Relational and executive processes have been implicated in these age-related EAM changes. The goal of the present study was to investigate, for the first time, whether these cognitive processes are also associated with the initial mental search for EAMs in young and older adults.
Participants and Methods: Twenty young and twenty older adults completed a task designed to capture the mental search and elaboration of EAMs. We correlated rates of direct search-to-retrieval of EAMs (i.e., immediate retrieval), generative search-to-retrieval of EAMs (i.e., protracted search through autobiographical knowledge), and episodic specificity of event elaboration with relational processing, working memory, inhibition, and generative fluency.
Results: We found that older adults demonstrated lower rates of search-to-retrieval of EAMs (both direct and generative) and reduced episodic detail generation during elaboration. We also observed that the ability to generatively search for and retrieve EAMs was significantly and moderately associated with inhibition, although the magnitude of the relation was slightly larger in young adults. In comparison, episodic specificity in event elaboration was significantly and moderately correlated with inhibition in young adults, but weakly correlated in older adults.
Conclusions: These findings indicate that both young and older adults with poorer inhibition are less likely to generatively retrieve EAMs. Poorer inhibition was also associated with lower episodic specificity during event elaboration, but only in young adults. We suggest that different cognitive processes contribute to over-general memory in early versus later stages of EAM retrieval in older adults.
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M. WILLIAMS, L.V. GRAVES, L. DELANO-WOOD, M. BONDI, J. COREY-BLOOM, D. DELIS & P. GILBERT. Comparing Memory Profiles of Individuals with Amnestic Mild Cognitive Impairment and Premanifest Huntington's Disease Using the CVLT-II.
Objective: In an effort to elucidate early memory profiles associated with Alzheimer's disease (AD) and Huntington's disease (HD) pathology, the present study explored memory performance of individuals with amnestic mild cognitive impairment (aMCI) or premanifest Huntington's disease (PreHD) on the California Verbal Learning Test-Second Edition (CVLT-II). Previous research has suggested that individuals with PreHD may exhibit memory impairment when compared to demographically similar individuals, though the degree to which the memory profiles associated with PreHD and aMCI differ has not been investigated.
Participants and Methods: 18 individuals diagnosed with aMCI and 48 premanifest gene carriers for HD were administered the CVLT-II using standard procedures. Participants in the PreHD group were shown in a previous study to perform significantly worse on the CVLT-II compared to a demographically similar group. Standardized scores, corrected for age and gender, were used in all analyses. A false-discovery rate adjustment of .05 was used to correct for multiple comparisons.
Results: The aMCI group performed significantly worse than the PreHD group on measures of immediate recall, short delay recall (free and cued), long delay recall (free and cued), and semantic clustering ($ps < .05$). Interestingly, the two groups performed similarly on the Total Recognition Discriminability and Source Recognition Discriminability indices, while the aMCI group performed significantly worse on the Novel Recognition Discriminability index ($p < .05$).
Conclusions: Results showed that, although the aMCI group demonstrated poorer performance on recall and semantic clustering, both groups performed similarly on total and source recognition discriminability indices. These findings underscore key differences in the prodromal profiles of AD and HD, while further demonstrating the utility of the CVLT-II in evaluating episodic memory changes associated with aMCI and PreHD.
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Other

J.R. ANDERSON, M. SPITZNAGEL, K. MAKI & O. PALACIOS. Baseline Glucoregulatory Function Determines Postprandial Complex Attention Performance over Time following Dairy Milk, Fruice Juice, and Water.

Objective: Recent work suggests dairy milk facilitates complex attention relative to high-sugar options among healthy children and college students with higher fasting glucose. However, postprandial cognition is impacted by age and differs as a function of time since ingestion. We examined the role of baseline glucoregulatory function in postprandial complex attention after dairy milk, apple juice, and water among adults, using an extended postprandial timepoint. We expected participants with higher fasting glucose would perform best after low-sugar beverages (i.e., milk or water) compared to juice.

Participants and Methods: Healthy, overnight-fasted adults (n=44) attended three morning sessions in a randomized, counterbalanced, repeated-measures design. After baseline cognitive testing and blood draw, participants ingested 8oz of 2% milk, apple juice, or water. Re-testing occurred 30, 90, and 150 min post-ingestion. CNS Vital Signs Complex Attention domain scores (Continuous Performance, Shifting Attention, and Stroop tests) were analyzed using linear mixed modeling.

Results: Adjusting for age, analyses revealed a significant Beverage*Glucose*Time interaction comparing water and juice conditions (b=-1.28*10^{-4}, SE_b=5.28*10^{-5}, p=.02), with a similar trend comparing milk and juice conditions (b=1.05*10^{-4}, SE_b=5.87*10^{-5}, p=.07). Participants with higher fasting glucose performed better following lower-sugar beverages at 30 min, with reversal of this pattern at 150 min.

Conclusions: Persons with higher fasting glucose initially demonstrate better complex attention following low- versus high-sugar beverages, but this effect reversed over time. Results suggest individual differences in glucoregulation play an important role in postprandial cognitive response. Further work should assess the presence of an optimal blood glucose range for postprandial complex attention, and determine whether periodic nutrient intake can maintain this optimum level for extended durations.

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B.C. ORR, J. XU & L.J. P. ALTMANN. Inference Generation in Discourse Production Relates to Language Complexity and Cognition.

Objective: Inferencing ability is central to reading and listening comprehension. Studies show that inference ability during comprehension can be predicted by comprehension of complex syntax, working memory (WM), and inhibition. However, no research is available that discusses inference generation in language production. The current study compares discourse elicited by 3 Norman Rockwell pictures to examine the role of linguistic and cognitive factors in the production of inferences during story-telling.

Participants and Methods: Twenty-one adults aged 18-30 generated stories prompted by 10 Norman Rockwell pictures. Three pictures eliciting language of similar language complexity (Principal's Office, After the Game, & Saying Grace) were scored for elaborative inferences. Principle component analysis over 8 cognitive tasks revealed three factors: WM, inhibition, and cognitive speed. Cognitive factors and language complexity were used to predict inference generation.

Results: "Principal's Office" elicited significantly more elaborative inferences than the other 2 pictures (both p<.001), which did not differ. The number of elaborative inferences in "Principal's Office" was predicted by language complexity (r^2=.34), WM (r^2=.08), and inhibition (r^2=.08). Only language complexity predicted inference generation in the other two pictures.

Conclusions: The number of inferences generated in speech was dependent upon the picture. While language complexity was a significant predictor of inference generation in all pictures, WM and inhibition only contributed to inference generation in the stories about one picture, the picture associated with the most elaborative inferences. Thus, inference generation in both comprehension and production is highly related to language complexity, suggesting both may index a common underlying language ability; however, relationships between cognitive abilities and inference generation are not static, but vary by stimulus.

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M. PLESHKEVICH. Acting and Consciousness: The Effect of an Interference Task on Actor Performance.

Objective: The nature of consciousness, loosely defined as the study of the contents of the mind of which one is aware, has been heavily debated. The art of acting, drama, or theatre has largely been excluded from this discussion in the scientific community. Because acting is an art that requires an exploration of consciousness, its study is beneficial in forming a more complete picture of the concept. The purpose of the current study was to investigate whether acting performance is more successful when utilizing a divided or united approach to consciousness.

Participants and Methods: Participants enrolled in the study were self-described actors. They were asked to perform a monologue three times, twice while doing a keyboard task. Two different sets of instructions were provided for the keyboard task: one that asked participants to incorporate the task into the world of their monologue, and another that asked them to dissociate it from their performance. The variables studied included an evaluation of performance on primary and secondary tasks, as well as responses on a creativity and dissociative experiences questionnaire and to three open-ended questions.

Results: A paired t-test to compare differences between monologue and keyboard-task performance based on study condition revealed a significant difference in both the monologue and keyboard-task performance scores for the divided and unified conscious conditions; $t(23)$= 1.73, p = 0.049, d = 0.35, $t(23)$ = 2.12, p = 0.023, d = 0.38. Participants performed better on both tasks when they were asked to incorporate the keyboard task into the imagined world of their monologue.

Conclusions: These results show that a unified conscious approach results in better performance on certain tasks, implying that unified consciousness may be more adaptive for certain daily functions. Future research in consciousness should focus on the contexts in which unified or divided approaches to consciousness work best.

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Visuospatial Functions/Neglect/Agnosia

O. BOUKRINA, P. CHEN, T. BUDINOSKA & A. BARRETT. Psycholinguistic and Neuroanatomical Correlates of Neglect Dyslexia.

Objective: Neglect dyslexia, presenting as reading errors in the left part of horizontal letter strings after right brain damage, is a symptom of spatial neglect, an acquired disorder affecting attention contralateral to the injured hemisphere. This study examined cognitive and neural mechanisms underlying the spatial distribution of reading errors in neglect dyslexia.

Participants and Methods: Right stroke survivors with spatial neglect (N=110) read (or spelled) aloud 1 of 2 lists of 36 words, presented sequentially at the center of the screen. Reading errors were scored as contralesional (error in the left half of the word) or other. The interaction of spatial attention and lexical processing was studied with a stepwise regression using word frequency, orthographic neighborhood (number of same length neighbors that differ by 1 letter), bigram and trigram counts (number of words with the same 2- and 3-letter combinations), word length, concreteness, and imageability as predictors of left-sided errors. MRI/CT images of 92 patients were used in a Voxelwise

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Lesion Symptom Mapping to identify brain lesions likely to lead to spatial reading deficits.
Results: Longer length and more trigram neighbors exacerbated ($p < 0.001$) while higher concreteness reduced ($p < 0.05$) the rate of left-sided errors. When controlling for lesion volume and other errors, left-sided errors were higher in patients with lesions in the inferior temporal sulcus, middle temporal and angular gyri, precuneus, temporal pole, inferior/superior longitudinal/inferior fronto-occipital fasciculi, optic radiation and the splenium.
Conclusions: We show that word properties influence reading accuracy in neglect dyslexia and that both posterior temporal-parietal and anterior temporal areas are implicated in this disorder. Orthographic competitors may decrease word salience, while semantic concreteness may constrain the available word options when selection is based on degraded information from the left side of the word. Future studies are needed to test this hypothesis.
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D. CAPRUSO. Two- and Three-Dimensional Constructional Ability in Alzheimer's Disease.
Objective: To determine whether two- and three-dimensional constructional performances in Alzheimer's disease (AD) are related to a specific loss in spatial ability, or reflect a more general loss of intellectual functioning.
Participants and Methods: Subjects (n = 22) were patients diagnosed with AD, and for whom CT or MRI was negative. Neuropsychological evaluations included two-dimensional Block Design (BD) or Three-Dimensional Block Construction (3DBC). Subjects were divided into Mild Cognitive Impairment (MCI, n = 10) and Dementia (n = 12) groups based upon the extent of deficits on non-constructional tasks.
Results: On BD, the performance of patients with Dementia (M = 4.90) was worse than for patients with MCI (M = 10.20), $F_{1,19} = 23.30$, $p < .001$. On 3DBC, the performance of patients with patients with Dementia (M = 19.00) was also worse than for patients with MCI (M = 27.80), $F_{1,19} = 7.34$, $p < .05$. Rates of borderline or defective performances were as follows: On BD with MCI (0%), with Dementia (78%), Fisher Exact $p < .01$; On 3DBC with MCI (20%), with Dementia (70%), Fisher Exact $p < .05$. Step-wise multiple regression predicted BD performance using Picture Completion and Visual Naming, Adjusted R^2=.70, $F_{2,12} = 15.12$, $p < .01$. 3DBC was predicted by Judgment of Line Orientation alone, Adjusted $R^2 = .92$, $F_{1,12} = 56.69$, $p < .001$.
Conclusions: When compared to BD, 3DBC contains a third spatial dimension and does not demand an additional intellectual component. The regression analysis was consistent with the expected effects of the neuropathological progression of AD, which typically spreads to the association cortex before reaching the visual centers of brain. BD performances were predicted by tests of visual intelligence and confrontation naming, both of which involve the association cortex. In contrast, 3DBC was predicted by Judgment of Line Orientation alone, which can be performed using an intact primary visual cortex. The test of 3DBC is more reflective of spatial functioning in AD than is BD.
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B.B. DEVORE, R.W. CAMPBELL & D.W. HARRISON. Dynamic Spatial Behavior Responding to Emotionally Valenced Stimuli Based upon Functional Cerebral Systems Theory.
Objective: The current experiment was designed to test assumptions about preferential hemispheric processing of emotion regulation and spatial representation while extending the previous research to theoretical models of lateralized cerebral functions.
Participants and Methods: 34 participants were recruited from a major University to participate in the spatial-emotional experimental task. Participants were seated in front of a spatial display with quadrants divided into left/right and proximal/distal sections. The experiment was separated into a pre/post cold pressor stress condition. In both conditions participants were asked to spontaneously place stimuli, either single words or facial pictures normed as either positively or negatively emotionally valenced, on the spatial display. Behavioral responses were recorded as the number of each stimuli placed either left or right of midline and proximal or distal to the participant.
Results: Results from two (horizontal vs vertical) mixed design ANOVAs demonstrated men preferentially place positively valenced faces, pre and post ($F = 8.24$, $p = 0.001$; $F = 5.73$, $p = 0.02$) to the right and negatively valenced faces, pre and post condition ($F = 7.73$, $p = 0.007$; $F = 4.61$, $p = 0.036$) to the left. Vertical results demonstrated men preferentially place positively valenced words pre-condition ($F = 4.94$, $p = 0.03$) and negatively valenced words, pre and post condition ($F = 9.18$, $p = 0.004$; $F = 10.38$, $p = 0.002$) more proximal to themselves. Women placed positively valenced words post-condition ($F = 4.18$, $p = 0.043$) and negatively valenced words pre-condition ($F = 5.22$, $p = 0.024$) more proximal.
Conclusions: The current preliminary experiment appears to support evidence that men are more likely to respond to emotionally valence stimuli with left hemispheric activation, while women appear to bilaterally activate when faced with similar stimuli. Behavioral responses for vertical placement varied by sex and valence with all significant responses indicating proximal placement of stimuli.
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M. SMIT, M. BECKMANN, L. KRAK, J. KAPPELLE & C. DIJKERMAN. Distortions In Hand Shape Perception In Patients With Somatosensory Deficits Following Stroke.
Objective: The perception of our body depends on input from different sensory modalities including vision, touch and proprioception. In healthy participants, temporary loss of somatosensory input has been found to result in altered (enlarged) perception of the anesthetized body part. In the current study we investigated whether somatosensory impairment following stroke affects hand size and shape perception.
Participants and Methods: Ten chronic stroke patients (> 4 months post-stroke, mean age =60.17 years) and 28 age-matched healthy controls (mean age 56.02 years) participated in this study. The patients had suffered frontal, parietal or occipital brain damage resulting in somatosensory deficits. All participants were tested on a set of screening tasks assessing basic somatosensory function. In addition, they performed two tasks which assessed perceived hand shape. In an implicit hand size perception task, participants were required to indicate on a computer screen the location of 10 landmarks (e.g. tip of the index finger) of a hand hidden underneath the computer screen. In the explicit task, pictures of their own hand were systematically enlarged or reduced in size and participants were asked to indicate whether the depicted hand was larger or smaller than the real hand.
Results: Healthy control participants showed accurate explicit judgements of hand size, but distorted implicit hand maps, with shorter fingers and wider hands, consistent with previous studies. The stroke patients also showed accurate explicit judgments, however, the implicit hand maps were in patients more distorted than in healthy participants.
Conclusions: These findings suggest that somatosensory deficits following stroke can affect implicit representations of hand size. However, explicit visual perceptual judgements appear unaffected. The distortions in implicit hand size representation in the stroke patients may have consequences for accurate reaching and grasping responses in peripersonal space.
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E.D. HAAN, S. SCHOLTE, A. SMITS & N. SEIJDEL. Action Blindsight and Antipointing in a Hemianopic Patient.

Objective: Blindsight refers to the observation of residual visual abilities in the hemianopic field of patients without a functional V1. Given the within- and between-subject variability in the phenomenal experience of blindsight patients, the fine-grained description of the phenomenon is still debated.

Participants and Methods: Here we tested the patient MS with established "perceptual" and "attentional" blindsight (c.f. Danckert & Rossetti, 2005) with a pointing paradigm. MS suffers from a complete left homonymous hemianopia after a severe atack of encephalitis some 40 years ago.

Results: MS showed clear above-chance manual localisation of 'unseen' targets. In addition, target presentations in his blind field led MS, on occasion, to spontaneous point towards positions his sighted field.

Conclusions: In MS, visual stimulation of his blind field can lead to "action blindsight" and "spontaneous antipointing", in addition to "perceptual" and "attentional" blindsight that had already been established by Cowey (2009). With respect to the latter, we suggest that MS may have registered the stimulation and subsequently presumes it must have been in his intact half field. The latter observation is explained with reference to the distinction between type 1 and type 2 blindsight as proposed by Weiskrantz (1998).

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J. HANSEN, E.S. WANDINGER, J. UPSHAW, K. DONNELLY, D. LEITNER, M. CAMPBELL, A. PARKER, H. MILLER & M. LIBBEN. How did the Neglect Patient Cross the Road?

Objective: Hemispatial neglect is defined as a failure to report, respond, or orient to stimuli on the contralesional side of space. Unsurprisingly, such lateralized inattention can result in a number of problematic and dangerous behaviours among patients. Although neglect symptoms have been well documented, few studies have focused on street crossing specifically, or on how computer programs might aid in the rehabilitation of this important skill. The current study aimed to investigate patients' street crossing behaviours using a computerized crosswalk exercise in conjunction with eye-tracking.

Participants and Methods: Stroke patients and age matched controls completed a computerized street crossing exercise at three difficulty levels while eye movements, fixation durations, collisions, and close calls were recorded. Task performance across groups was compared to determine whether neglect patients experienced more collisions or close calls with vehicles approaching from the neglected side of space, and whether this was related to their patterns of attention and eye movement.

Results: Neglect patients spent twice as much time exploring the right side of the virtual street compared to the left. Additionally, those with neglect had nearly twice as many collisions with vehicles approaching from the left side compared to the right side (11 vs. 7).

Conclusions: This study is a preliminary step in investigating the utility of virtual street crossing exercises for assessment and rehabilitation of safe street crossing behaviours among neglect patients. Future studies might assess if this paradigm could be used repeatedly with patients in order to practice and improve neglect symptoms before being subjected to real vehicles.

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A. MANKOWSKA, K.M. HEILMAN, J. WILLIAMSON & M. HARCIAREK. Women Reach Higher Than Men: The Vertical Spatial Attentional Biases of Women and Men.

Objective: Normal individuals often have a leftward and upward attentional spatial bias. Women are more accurate than men finding the veridical center of horizontal lines. This gender-related difference in horizontal allocation of spatial attention has been attributed to men's greater right-hemisphere lateralization of spatial attention. The right hemisphere might also be responsible for the upward bias. Thus, the purpose of this study was to learn, if there are sex differences in the vertical allocation of spatial attention.

Participants and Methods: Eighteen healthy men (mean age 39.61±15.07 years) and 19 healthy woman (mean age 34.64± 15.15 years), performed line bisections using 24 vertical lines (24 cm long and 2 mm thick) aligned with their midsagittal plane.

Results: Participants showed a systematic upward bias. However, women exhibited a significantly greater upward bias than men.

Conclusions: The reason for woman's greater upward bias is not known, but these results suggest that women have relatively stronger activation of their ventral (versus dorsal) visual attentional network. There are several differences between the functions of the dorsal and ventral networks including the allocation of global (dorsal) versus focal (ventral) attention, and mediation of allocentric (ventral stream) versus egocentric (dorsal) attention. Thus, women might be more likely than men to allocate focal and/or allocentric attention. Also, Suavansri et al. (2012) reported that vertical line bisections were higher when performed with the right than left hand, and it is possible that woman might have a greater left hemispheric action asymmetry than men. However, future studies are needed to learn what accounts for this gender difference.

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C. CORR & A. JANSARI. I'm lost! An investigation of topographic agnosia in a case series of individuals with acquired prosopagnosia.

Objective: The link between prosopagnosia and topographical agnosia is established but there has been little research into this association. Carrow et al. (2016) found a link between anatomic sub-type of prosopagnosia and place recognition, with further issues moderated by lesion location. Further, Claessen & Van Der Ham's (2017) Model of Navigational Impairment (MNI) set out three categories of navigation: landmark, location and path-based navigation. Our objectives were to 1) utilise the new MNI in assessing the profile of topographic disorientation; 2) compare this profile of navigational deficit amongst the different anatomic sub-types prosopagnosia.

Participants and Methods: Three patients with acquired prosopagnosia and topographic agnosia were compared to 10 matched controls. Participants were assessed on the Benton Facial Recognition Test, Warrington Memory Test, Jansari Unfamiliar Face Memory Test and Essex-Exeter Match Difficulty Object & Faces Test to evaluate general visual abilities. Then participants completed the Santa-Barbara Sense of Direction Questionnaire (SBSOD) and a series of empirical tests to evaluate specific aspects of the MNI.

Results: Landmark-based navigation was impaired with parietal and temporal lobe injuries but only in the 'novel landmark' category. Location-based navigation was significantly impaired across all three patients. Path-based navigation was only impaired in the individual with parietal-lobe injury (all ps<0.05). Additionally, self-reported navigational difficulty as measured by the SBSOD was significantly correlated with deficits in landmark ($r=.71$, $p<0.05$) and location based ($r=.97$, $p<0.05$) navigation.

Conclusions: We concluded that topographical disorientation in prosopagnosia reflects impaired location based navigation most notably, with differentiation in landmark and path based navigation dependent on anatomical sub-type. The findings show successful differentiation of navigational ability using the new model and present some contrasts to previous research in the field.

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M.C. LEITNER, S. HAWELKA, L. VIGNALI, S. SCHUSTER, P. MARVAN & F. HUTZLER. Eye Tracking Based Visual Field Diagnostics: Development of a Modern Neuropsychological Diagnostics Tool for Evaluation of Neuroplasticity in the Visual Cortex.

Objective: A consequence of lesions to the visual cortex – due to stroke or trauma – is partial loss of vision (scotoma). Whether treatment of scotoma with "Visual Restitution Training" (VRT) improves visual field loss is – as yet – uncertain. Several studies reported evidence for neuroplasticity in the visual cortex, while other studies suggest that these findings simply reflect methodological shortcomings rather than actual improvement. These shortcomings primarily refer to inadequate fixation control and susceptibility to compensation strategies during visual field diagnosis. Therefore, we developed a new paradigm for visual field diagnosis which incorporates a stringent fixation control and adaptive stimulus presentation.

Participants and Methods: The blind spot is a natural scotoma in the unimpaired visual field. In order to assess reliability of our paradigm we diagnosed the individual size and extent of the blind spots in 41 normally sighted participants (repeatedly) with our new tool. Regarding validity we compared our results with the results of established diagnostic tools, such as "Goldman Perimeter" and "Optical Coherence Tomography" (OCT).

Results: Analysis shows that only 8 out of 164 (4.9%) repeatedly conducted visual field tests differ significantly in the individual blind spots location and/or extent. Further, OCT fundus pictures demonstrate that these results match with retinal-anatomical formations of the participants individual blind spots.

Conclusions: Results indicate that our tool is reliable and valid in diagnosing scotomas in the visual field. Findings further suggest that our paradigm offers an unprecedented accuracy in visual field diagnosis. Therefore we can proceed optimizing our tool for clinical usage and investigate the impact of VRT on the treatment of scotoma.

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E. SHEPHARD. Idiopathic acquired prosopagnosia or right temporal lobe variant of frontotemporal dementia: A case study.

Objective: This case study describes a woman with an acquired prosopagnosia of unknown etiology. Documented cases of prosopagnosia include developmental prosopagnosia, those acquired subsequent to inferior occipitotemporal lesions, and limited cases of a right temporal lobe variant of frontotemporal dementia (RTLV of FTD). No cases to our knowledge have documented an isolated acquired deficit in facial recognition in the absence of neurological damage or other symptoms consistent with FTD.

Participants and Methods: The patient is a 64-year-old, white, right-handed female referred for evaluation due to acquired difficulty recognizing faces over the prior five years, with limited symptom progression, and retained ability to recognize individuals by voice or semantic information. History included onset of depression five years ago, cardiac issues, and longstanding hypothyroidism. Neurological examination revealed no visual field defects, color agnosia, or other visual processing deficits. Brain MRI indicated mild anterior-inferior right temporal lobe atrophy. PET scan demonstrated mild bilateral anterior-inferior temporal lobe volume loss, right greater than left, with abnormal FDG uptake.

Results: Results of neuropsychological testing indicated selective deficits in facial recognition, affect recognition, and visual integration. Low scores on language testing were attributable to word retrieval and inferential errors rather than semantic or perceptual loss. Functioning was intact across domains of attention and working memory, episodic memory, and executive functioning. Psychologically, mild symptoms of depression and anxiety were reported, with no evidence of a behavioral disorder.

Conclusions: The patient's symptoms and neuroimaging were consistent with those often seen early in the course of RTLV of FTD; however, the circumscribed nature of her deficits, lack of clear symptom progression, and the protracted timeline were more suggestive of an isolated idiopathic acquired prosopagnosia. Continued monitoring was recommended.

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Invited Symposium 3. Global Neuroscience: Impact of Culture, Resources, and Education

Chair: Deborah Koltai

Presenters: Lucia W. Braga, Kevin Robertson, Martin Kaddumukasa, Michael J. Boivin

1:45–3:15 p.m.

D. KOLTAI, L.W. BRAGA, K. ROBERTSON, M. KADDUMUKASA, M.J. BOIVIN & J.L. PONSFORD. Global Neuroscience: Impact of Culture, Resources, and Education.

The 2019 theme of the February meeting of the International Neuropsychological Society focuses our attention to the intersection of biological, psychological, and cultural factors impacting the neurosciences. In this invited symposium, we demonstrate how the biopsychosocial model varies and must adapt to the unique challenges, constraints, and culture of each setting for the conduct of effective neuroscience research, treatment and education. Drawing from field research and outreach, clinical practice settings, and traditional biomedical scientific settings across continents, we will highlight work in populations with HIV, epilepsy, TBI, and neurotoxic Konzo disease. Many of the factors impacting these studies likewise impact the growth and development of neuropsychology as a field. They highlight a paucity of assessment tools and normative standards, poor recognition of efficacy and relevance, lack of advanced training and supervision mentors and opportunities, lack of resources for sophisticated neuroscientific investigations, poverty and limited access to care, linguistic and literacy diversity, stigma, and impoverished health care systems. Still, despite these considerable challenges, neuroscientific research and practice grows, studies are conducted adapting to and surmounting challenges, and multisite, multination networks advancing our work are emerging. Specific and broad ventures will be discussed.

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L.W. BRAGA. Maximizing Resource Limitations with a Validated Model of Neurorehabilitation in Brazil.

The fields of neuropsychology and neurorehabilitation have evolved over the last few decades in South America, particularly in Brazil. Traumatic brain injury can result in extensive motor, cognitive, behavioral, and social impairments, requiring life-long rehabilitative interventions. Addressing the challenges faced by individuals and families with TBI is of particular concern in countries with socioeconomic issues and restricted access to comprehensive support networks. Ecological methods of intervention, which maximize available resources and include the participation of professionals, family, and caregivers have yielded superior results while providing widespread neurorehabilitation services across socioeconomic strata and disabilities.

This presentation focuses on interdisciplinary and family-centered models of intervention used throughout Brazil and several countries in South America. Results from clinical trial studies demonstrate improved functional and structural connectivity in the brain on fMRI and DTI neuroimaging studies. The model incorporates training and participation of professionals and family in the intervention, and can be naturally

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incorporated into the individual's daily routines. It is sustainable over the lifespan, and results in accumulated gains, greater patient satisfaction and quality of life. Research has shown that the parent's educational level does not impact their ability to conduct the rehabilitation exercises with their child at home, thereby maximizing resources, which is of particular importance in settings with scarce resources.
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K. ROBERTSON. Challenges in HIV Neurocognitive Clinical Research in Resource Limited Settings.
HIV Associated Neurocognitive Disorders remain problematic despite advances in antiretroviral therapy (ART). However, conducting neurocognitive clinical research in resource limited settings (RLS) can be challenging in many aspects. Clinical trials can be especially daunting and difficult in RLS, especially when there is assessment of neurocognitive performance within these clinical trials. The International Neurocognitive Study (INS) is an example of such a neurocognitive clinical trial, and enrolled participants in Brazil, India, Thailand, South Africa, Malawi, Peru, and Zimbabwe. The INS was the first foray of the NIH AIDS Clinical Trials Group into RLS in the early 2000's, and many lessons were learned along the way from infrastructure, training, ethical, to cultural and personal. To address some of these issues, the International Neurocognitive Normative Study (INNS) prospectively enrolled 2400 high risk HIV negatives from the sites aligned with INS. INS found significant improvement in NP with ART initiation and follow up over time, out to 196 weeks on the clinical trial. With the initiation of ART treatment, the odds of NP impairment were reduced by 12% (95% CI: 9%, 14%) for every 24 weeks ($p<.0001$) on the clinical trial. The INS and several other studies including SMART and START will be the basis for examples of the unique issues encountered in international and RLS neuropsychological clinical research; some experience on what to do and what not to do will be discussed and shared.
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M.M. KAJUMBA, D. KOLTAI, P. CHAKRABORTY, P. SMITH, M. KADDUMUKASA, M. KADDUMUKASA, A. FULLER & M. HAGLUND. Understanding Practical and Cultural Drivers of Neurologic Health Care Utilization.
In sub-Saharan Africa, the epilepsy treatment gap is immense, with estimates suggesting that <70% of people with epilepsy (PWE) reach care. We explored the perceived barriers to reaching biomedical care, beliefs, and attributions of 626 PWE who eventually sought care at Mulago National Referral Hospital and its affiliate clinics, Butabika National Referral Hospital, and Mbarara Regional Referral Hospital in Uganda, Africa. In this sample (mean age = 23.0 years, SD= 13.2), average age of seizure onset was 0.98 years (SD= 0.2), with an average reported seizure frequency of 56.8/month (SD= 119.0) at onset and 10.9/month (SD= 40.4) with current treatment. Notably, 92.9% of the sample reported loss of consciousness with seizures and 55.4% reported significant learning difficulties, reflecting a sample severely affected. While we explore many possible barriers to seeking biomedical care, those related to travel distance and cost, and drug cost and availability were reported as the most frequent challenges. Importantly, demographic, educational and cultural factors impact beliefs about epilepsy as infectious disease (7.8%), and belief that spiritual, witchcraft, mystical, or biological factors can be causative. Many of these beliefs are firmly rooted in cultural causal belief systems, which impact not only attributions for illness but also health care utilization patterns. For instance, beliefs about etiology, demographics, illness factors, and family illness-to-assistance ratios independently predict ($p<.05$) choice of treatment type (biomedical, traditional healer, pastoral) and/or time to biomedical care. We will discuss how this cultural context impacts research design, data collection and interpretation, and ultimately, capacity building and neuroscience clinical care.
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M.J. BOIVIN, D. TSHALA-KATUMBAY & E. KASHALA-ABOTNES. Challenges Faced and Lessons Learned in the Application of Global Neuroscience to Prevent Konzo Disease in the Democratic Republic of Congo.
Our global neuroscience capacity building partnership is embedded within a NIH-sponsored research program for scaling up a community-based caregiver training intervention to prevent konzo disease in the DR Congo. Konzo is a neurological disease affecting impoverished women and children throughout central and western Africa; caused by cyanide toxins in poorly processed cassava. We have faced language and cultural challenges in our behavioral interventions and neuropsychological assessments in our implementation of our intervention to address one of the most significant public health challenges in the Congo basin. In adapting early childhood caregiver training (ECD) interventions used in our prior clinical trial studies with Ugandan mothers and their HIV-affected children, we have applied this intervention model to very young children at risk for konzo in mother/child dyads in the DRC. We will share lessons learned on cultural and linguistic caregiver challenges in implementing ECD in konzo-affected DRC communities, amidst the political and logistical realities of the DRC today. These include challenges in adapting interventions to be sustainable and viable against a backdrop of droughts, economic decline and struggle, the social challenges posed by conflict-induced population displacement and food and water insecurity. From a social justice standpoint in the integrations of global neuroscience with public health need, konzo especially affects women and children who have the least access to meat, beans, and other sources of sulfur amino acids necessary for the liver to detoxify cyanide in the body. We will discuss dimensions of gender inequity, child disability from konzo and its impact on mortality and morbidity in rural impoverished communities, and the global fundamental right that such konzo-disabled women and children have to accessing services; making global neuroscience foundational to the UN Sustainable Development Goals for this new millennium.
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Paper Session 12. Aging- General

Moderator: Benjamin Hampstead

1:45–3:15 p.m.

K.B. CASALETTO, F. ELAHI, A.M. STAFFARONI, S.M. WALTERS, W. RIVERA CONTRAS, A. WOLF, D. DUBAL, B. MILLER, K. YAFFE & J. KRAMER. Cognitive Aging is Not Created Equally: Differentiating Unique Cognitive Phenotypes in "Normal" Adults.
Objective: Age-related cognitive decline is a major public health problem, but highly diverse. Terms like "normal aging" may underappreciate our ability to predict specific cognitive trajectories in healthy adults. We aimed to classify and identify baseline predictors of unique cognitive aging phenotypes in high-functioning adults.
Participants and Methods: 314 older adults (age *M*=69y; 55%F) completed 2+ annual visits (*M*=4) and were classified as clinically normal at every visit. Participants completed measures of episodic memory and processing speed longitudinally. Those demonstrating a longitudinal slope in memory or speed -1 SD of the sample were classified as "declining" on that measure. We then examined baseline characteristics that differentiated "declining" vs. stable phenotypes on memory or speed.
Results: Overall, our clinically normal adults evidenced *improving* memory (b=0.04, p=0.06) and mild speed slowing (b=-0.04, p=0.001) over time. 29 were identified as decliners in processing speed and 50

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as decliners in memory; only 7 (2.5%) met criteria for both, who were excluded. At baseline, speed declining adults demonstrated older age, higher inflammation, and more cognitive complaints compared to speed stable adults. Memory declining adults were more likely to be male, and had fewer depressive symptoms, smaller gray matter volumes, and less white matter injury compared to memory stable adults at baseline. Multivariable models showed that baseline speed, TNFa, and cognitive complaints accurately classified 96.3% of those who developed a speed phenotype; baseline memory, male sex, smaller precuneal volume, and fewer white matter hyperintensities accurately classified 88.5% of those who developed a memory phenotype.

Conclusions: We argue there are discrete cognitive aging phenotypes reflecting *non-overlapping* vulnerabilities in high-functioning adults. "Normal cognitive aging" may not capture the diversity of neurologic aging; appreciation of this spectrum may unlock insights into the development of aging brain diseases.

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R. KOSCIK, B.P. HERMANN, L. CLARK, E. JONAITIS, K.D. MUELLER, S. ALLISON, T.J. BETTHAUSER, H. SHOUEL, C. GLEASON, N. CHIN, C. CARLSSON & S. JOHNSON. Validity Evidence for a Research Pre-MCI Cognitive Status Group: "Cognitively Unimpaired - Declining"

Objective: As suggested by the recently published NIA-AA AD guidelines, methods are needed to identify signs of potentially dementia-related cognitive changes before onset of mild cognitive impairment (MCI). This study explored validity evidence for such a syndrome, *cognitively unimpaired-declining (CU-D)*, as operationalized in the Wisconsin Registry for Alzheimer's Prevention (WRAP).

Participants and Methods: 965 WRAP participants free of clinical impairment at baseline with follow-up assessment were included (baseline mean age ~54 years). Cognitive statuses were assigned for each visit via consensus review. CU-D was assigned when participants did not meet criteria for MCI or dementia but were ~1.5 SD below peers on ≥1 test. We used logistic regression to test the predictive validity of CU-D (outcome: progression to MCI or dementia). We used follow-up data to estimate Cohen's d among cognitively unimpaired-stable (CU-S), CU-D, and MCI on 11 concurrent measures of cognition primarily representing memory and executive function.

Results: 30 (3.1%) had progressed to MCI or dementia at their last visit. Covariate-adjusted risk of progressing to MCI/dementia was higher in baseline CU-D vs CU-S group [OR (95%CI) = 3.9 (1.7-9.0); 2.4% of CU-S progressed vs 9.7% of CU-D]. Using first follow-up with CogState data (range=visit 2-6), scores on all cognitive measures differed across concurrent cognitive groups (p<.0001 on 4 composites based on scores used to assess progression; p<=.0012 on 7 CogState tests independent of progression.) CU-D (n=124) differed from CU-S (n=819) on all scores (p<=.0003; d = .35-1.7) and from MCI (n=22) on 3 composites (p<=.0002, d=.78-1.2). MCI differed from CU-S on 10/11 scores (p<=.001, d=.7–2.9).

Conclusions: Pre-MCI decline is detectable in late middle-age and signals increased risk of future clinical impairment. CU-D groups have potential to benefit from prevention/early intervention. Future analyses will test whether dementia risk factors such as Alzheimer's pathology differ between CU-D and CU-S groups.

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K. GIFFORD, D. LIU, O.A. KHAN, M. TURCHAN, J.E. BOGNER, C. BOWN, V. CHENJI, F. CAMBRONERO, S.L. LAMBROS, M.E. MOORE, K.E. OSBORN, K. PECHMAN, J.L. THOMPSON, T.J. HOHMAN & A.L. JEFFERSON. A Comparison of Subjective Cognitive Decline Tools in Cognitively Unimpaired Older Adults.

Objective: Subjective cognitive decline (SCD) is a promising marker of preclinical dementia, proposed as Clinical Stage 2 of the Alzheimer's disease (AD) continuum. Many SCD measures exist but there is no gold standard assessment tool. We compared the performance of multiple SCD tools to differentiate amyloid status and clinical progression in cognitive unimpaired older adults.

Participants and Methods: Cognitively unimpaired Vanderbilt Memory & Aging Project participants free of clinical stroke (n=160, 73±7 years) completed the Memory Functioning Questionnaire (MFQ), Everyday Cognition (ECog), Cognitive Difficulties Scale (CDS), and Vanderbilt 46-item SCD measure (V-SCD; developed using latent variable modeling for assessment of SCD in older adults for screening of AD). Clinical progression was defined using change in overall Clinical Dementia Rating score at 18-month follow-up (stable (n=128) vs. conversion (n=32)). Amyloid status was determined in a subset (n=83) that completed a baseline lumbar puncture for AB42 acquisition (pg/mL; positive<530 (n=17), negative>531, (n=66)). Area under the receiver operating characteristic (AUC) curve for each SCD tool was used to measure accuracy of discrimination between amyloid status and clinical progression.

Results: For discriminating amyloid status, AUC values ranged from 0.69-0.57 with the V-SCD tool showing the highest performance. For clinical progression, AUC ranged from 0.80-0.69 with the total SCD showing the highest performance, followed by V-SCD (AUC=0.76). ECog showed the lowest AUC for both outcomes. Unpaired and paired comparisons revealed no statistical differences in AUC values between the V-SCD SCD and all other SCD tools (p-values>0.13).

Conclusions: SCD measures demonstrate good performance for discriminating amyloid status and disease progression. Results highlight the potential utility and advantage of the V-SCD measure to screen for AD.

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K.R. THOMAS, E.C. EDMONDS, X. CAO, C.G. WONG, A.J. WEIGAND, S. COOPER, D.R. GALASKO, D. SALMON & M. BONDI. Objective Subtle Cognitive Decline, but Not Subjective Memory Complaint, Predicts Progression in Cognitively Normal Individuals.

Objective: Both Subjective Memory Complaints (SMC) and objectively-defined Subtle Cognitive Decline (SCD) have been used to identify cognitively normal (CN) individuals at risk for Alzheimer's disease (AD). We sought to compare SMC and SCD in predicting progression from CN to mild cognitive impairment (MCI) or AD.

Participants and Methods: CN participants (N=176; mean age=74.3±7.2 years) from the UC San Diego Alzheimer's Disease Research Center were classified as positive or negative for SMC based on self-reported memory complaint and/or SCD based on previously-defined neuropsychological criteria (>1 SD below mean on 2 neuropsychological total scores in different cognitive domains *or* 2 impaired process scores *or* 1 impaired total score and 1 impaired process score). Cox models, adjusting for age, education, and sex, examined the two classifications in predicting time-to-conversion to MCI/AD (follow-up ranged from 1-20 years; N=93 converters) and logistic regressions were used to determine sensitivity and specificity.

Results: SMC had a higher prevalence than SCD (SMC=42%, SCD=33%). There was very little classification agreement between SMC and SCD (16%; κ=-0.02, p=.833). SMC was not independently associated with risk of conversion (HR=1.44, 95% CI=0.93-2.23, p=.10), but SCD conferred an increased risk of MCI/AD (HR=2.03, 95%

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CI=1.25-3.30, *p*=.004). This effect persisted when both SMC and SCD were included in the model. SCD had increased specificity to predict progression and better overall classification than SMC. When the four-group predictor (CN, SMC, SCD, SMC+SCD) was included in the model, only SCD and SCD+SMC progressed faster than the CN group (*p*s<.05).
Conclusions: Only the objective neuropsychological SCD criteria, alone or in combination with SMC, significantly predicted incident MCI/AD. Findings add to growing evidence that sensitive neuropsychological measures, including process scores, may be used to identify SCD in preclinical AD, with stronger predictive value than subjective report.
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S.S. SAMUEL, J. VONK, P. LAO, M. ARCE RENTERÍA, K. LAING, R.J. FLORES VELASCO, A.M. BRICKMAN & J.J. MANLY. Association of Perceived Discrimination to Cognition among African Americans.
Objective: Perceived discrimination is associated with higher rates of depression and physical illness in older African Americans, but the effect of racial discrimination on late-life cognition is inconsistent. We investigated this relationship, hypothesizing that higher perceived discrimination would be associated with worse cognition in late life.
Participants and Methods: Linear regression models assessed the relationship between perceived discrimination and cognitive performance among 465 non-demented volunteers in a study of genetic risk factors for Alzheimer's disease among African Americans (mean age = 69 ± 8, 79% women, mean education 14 ± 3) who completed tests of attention, memory, language, and processing speed.
Results: Higher perceived discrimination was associated with younger age, higher education, and more depression. In unadjusted models, more discrimination predicted *better* memory but was not associated with language, speed, or executive function. This effect was attenuated when adjusting for age, sex/gender, and education. There were no interactions between discrimination and either sex/gender or educational attainment on cognitive test performance. However, compared to other sex/gender*education subgroups, a pattern of association of increased discrimination with worse memory and executive functioning was observed among well-educated black women. This pattern was also observed among well-educated black men, for whom increased discrimination was associated with lower scores on measures of letter fluency and processing speed.
Conclusions: Racially pattered social forces can be measured at the individual or area level, and encompass segregation, discrimination, and structural racism. In our cross-sectional sample, perceived discrimination was confounded with younger age and higher education. Discrimination may help explain sex/gender differences in cognitive returns to education and socioeconomic status.
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N. DJUKIC, S.M. WALTERS, D. COTTER, M. ALTENDAHL, M. YOU, R. LA JOIE, G. RABINOVICI, J. KRAMER & K.B. CASALETTO. Leisure Activities and Cerebral Amyloid Burden in Clinically Normal Older Adults: The role of APOEe4.
Objective: Prior research indicates that greater engagement in late-life cognitive and physical activity are uniquely associated with reduced risk of age-related cognitive decline and Alzheimer's disease. Animal models demonstrate that enriched environments may promote brain health via reduced beta-amyloid (Aβ) deposition. The *APOEe4* polymorphism (*e4*) is among the greatest known risk factors for development of Aβ plaques with age. We examined the association between self-reported cognitive, physical, and social behaviors and *e4* genotype on brain Aβ in community-dwelling older adults.
Participants and Methods: 32 clinically normal adults (age M=73.1; education M=16.9; 59.4% female; CDR=0; 25% *e4*) completed the modified Community Healthy Activities Model Program for Seniors (CHAMPS) Questionnaire and an Aβ PET scan (Florbetapir). CHAMPS quantified the number of cognitive, social, and physical leisure activities, TV watching (hours), and an estimate of total caloric expenditure in the past 4 weeks.
Results: Controlling for age, sex, and education using multivariable linear regression models, we found a significant interaction between *e4* and cognitive activities on Aβ (b =-0.03, p=0.04), where more reported cognitive activities were more strongly associated with less Aβ among *e4* individuals. A parallel model also showed a significant interaction between TV watching and *e4* genotype on Aβ (b= 0.02, p= 0.04), with a stronger positive relationship between hours of TV watched and Aβ in *e4* carriers. These models held when adjusting for total caloric expenditure (ps<0.05). Self-reported physical and social activities were not significantly associated with Aβ burden, regardless of *e4* genotype (ps>0.30).
Conclusions: Greater engagement in cognitively stimulating leisure activities was associated with less brain Aβ among *e4* carriers. Individuals with genetic risk for Alzheimer's disease may be more vulnerable to detrimental effects of cognitive inactivity and best positioned to benefit from cognitive training interventions.
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Paper Session 13. Pediatric TBI

Moderator: Alison M. Colbert

1:45–3:15 p.m.

A. TREBLE-BARNA, V. PILIPENKO, L. MARTIN, K. YEATES, H. TAYLOR, S. WADE & B. KUROWSKI. Influence of Inflammation-Related Genes on Neurobehavioral Recovery Following Traumatic Brain Injury During Early Childhood.
Objective: Neuroinflammation is increasingly recognized as a potential biological mechanism underlying neurobehavioral impairment following traumatic brain injury (TBI). We examined associations of inflammation-related genes with short- and long-term neurobehavioral recovery, as well as neurobehavioral recovery trajectories over time, in children who sustained early childhood TBI relative to children who sustained orthopedic injuries (OI).
Participants and Methods: Participants were recruited from a prospective, longitudinal study of children with TBI (*n*=68) or OI (*n*=72) between ages 3-7 years. Participants completed assessments at the post-acute period (0-3 months post-injury), 6, 12, and 18 months post-injury, and an average of 3.5 and 7 years postinjury. Thirty single nucleotide polymorphisms (SNPs) in inflammation-related genes (ACE, BDNF, IL1RN, NT5E) were examined in association with short- and long-term executive function (Behavior Rating Inventory of Executive Function) and behavioral adjustment (Child Behavior Checklist), as well as their trajectories over time. Longitudinal mixed models were interpreted at nominal (*p*<.05) and multiple testing corrected (*p*< 003) significance.
Results: After controlling for premorbid function, genetic variation within the BDNF and NT5E genes was differentially associated with neurobehavioral recovery trajectories following TBI relative to OI, with greater impact on long-term outcomes (*p*s<.05). Genetic variation within ACE and IL1RN genes was associated with short- and long-term outcomes across injury groups (*p*s<.05). No associations survived multiple testing correction.
Conclusions: The findings provide preliminary evidence that genetic variation in genes involved in inflammation plays a role in neurobehavioral recovery following traumatic injury, with the effects of BDNF and NT5E differentially associated with recovery from TBI. Individual genetic factors related to inflammation may account for unexplained heterogeneity in neurobehavioral recovery following pediatric TBI.

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H. VERHELST, C. VANDER LINDEN, T. DE PAUW, K. CAEYENBERGHS & G. VINGERHOETS. Altered Structural Connectome in Young Patients with Traumatic Brain Injury: Impaired Rich Club Organization and Increased Local Connectivity.

Objective: Recent evidence has shown the presence of a "rich club" in the brain, which constitutes a core network of highly interconnected and spatially distributed brain regions, important for high-order cognitive processes. This study aimed to examine the rich club organization in young patients with moderate to severe traumatic brain injury (TBI).

Participants and Methods: 17 adolescent patients (15.71 ± 1.75 years) with TBI in the chronic stage of recovery and 17 age and gender matched controls participated in the study. Probabilistic tractography was performed on diffusion weighted imaging data to construct the structural connectomes. Four global graph metrics (density, strength, normalized clustering coefficient, and normalized path length) were calculated to investigate group differences in overall brain topology. Next, the whole brain network was divided into a rich club network, a local network and a feeder network connecting the latter two. Density and strength were examined in these three subnetworks. Finally, functional outcome was measured with the parent form of the Behavior Rating Inventory of Executive Function (BRIEF) questionnaire.

Results: Our results revealed significant alterations in brain topology (p-values <.05) and impaired executive functioning (p <.001) in young patients with TBI compared with controls. Moreover, we observed reduced density values in all three subnetworks (p-values <.005) and a reduced strength in the rich club network (p = .013) together with an increased strength in the local network (p = .002) in patients with TBI.

Conclusions: The present study provides new insights into the nature of TBI-induced brain network alterations and supports the hypothesis that the local subnetwork tries to compensate for the biologically costly subnetwork of rich club nodes after TBI.

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A.P. FISHER, N. ZHANG, M. NARAD, B. KUROWSKI, J. AGUILAR, H. TAYLOR, K. YEATES, E. KAIZAR & S. WADE. Social and Behavioral Outcomes Following Online Problem-Solving Therapy for Children with Traumatic Brain Injury.

Objective: We conducted joint analyses from 5 randomized clinical trials of online family problem-solving therapy treatment (OFPST) for children with traumatic brain injury (TBI) to identify aspects of child behavior most sensitive to treatment.

Participants and Methods: We examined data from 368 children with moderate to severe TBI, ages 5 to 18, randomized to OFPST or a control condition. OFPST combined self-guided online modules and live videoconference sessions with a therapist to teach cognitive reframing, problem-solving, communication skills, and behavior management. We assessed child-behavioral outcomes before treatment and 6, 12, and 18 months posttreatment. Outcomes were based on parent report using the Child Behavior Checklist (CBCL), the Behavior Rating Inventory of Executive Function, and the Home and Community Social Behavior Scale.

Profile analysis was conducted using mixed effect model of the outcome measure scores on treatment group x measure x visit, with adjustment for baseline score, sex, age at baseline, parent education, and study site. Post hoc tests compared the treatment to the control group on each parent-reported measure to determine which showed responsiveness to OPFST at follow-up.

Results: Analysis revealed a significant group x measure interaction across follow-up visits (F (3, 725) = 3.48, p = 0.016). Specifically, children in the OFPST group demonstrated lower levels of CBCL externalizing (t (725) = -2.03, p = 0.043) and internalizing (t (725) = -2.48, p = 0.013) behavior problems relative to the control group. The groups did not differ significantly on measures of executive function behaviors or social competence.

Conclusions: Results supported the efficacy of OFPST to improve child behavior, with less robust effects on executive functioning and social competence. Examination of potential moderators, such as age or injury severity, may elucidate the influence of OFPST on executive functioning and social competence.

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M.D. MCCURDY, C. SALORIO, S.J. SUSKAUER & B.S. SLOMINE. Clinical Utility of the Cognitive and Linguistic Scale (CALS) for Predicting Long-Term Functional Outcome in Youth After Inpatient Brain Injury Rehabilitation.

Objective: Examine clinical utility of the Cognitive and Linguistic Scale (CALS) for predicting long-term functional outcomes of youth following inpatient brain injury rehabilitation.

Participants and Methods: One hundred-thirty-one youth (2-21 years; M=10.9, SD=5.46; 60% male) admitted to a pediatric inpatient brain injury rehabilitation facility following traumatic (39%) or acquired (61%) brain injury were evaluated with the CALS (scores range 20-100, higher reflects better functioning) at admission and discharge. Functional Independence Measure for Children (WeeFIM) ratings were obtained 12-months after discharge. WeeFIM Total Developmental Quotient (DQ) scores were used to classify outcomes as "Good" (≥85; n=97), "Moderate" (70-84; n=11), or "Poor" (<70; n=23). Linear regressions examined the utility of CALS Total scores in predicting WeeFIM DQs. CALS scores were compared across outcome groups using ANOVAs. Receiver operating characteristic (ROC) analyses were used to calculate area under the curve (AUC), and establish optimal CALS cut scores for predicting 12-month outcome.

Results: CALS at admission (ΔR^2=.22, p<.001) and discharge (ΔR^2=.49, p<.001) predicted 12-month WeeFIM DQs, after controlling for age at admission. Mean CALS scores at admission (p<.01) and discharge (p<.01) were significantly higher in Good and Moderate groups vs. the Poor outcome group. ROCs revealed CALS at admission (AUC=.83) and discharge (AUC=.90) adequately discriminated Good/Moderate from Poor outcomes, and Youden index yielded optimal cut scores for CALS admission (≥46) and discharge (≥64) scores. Functional outcome groups were accurately classified by both admission (80%) and discharge (88%) CALS scores.

Conclusions: The CALS demonstrates strong clinical utility in predicting long-term functional recovery following brain injury. The CALS may aid in the early identification of youth at risk for poor functional outcomes and help inform treatment planning after inpatient rehabilitation.

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E. LEBLOND, J. SMITH-PAINE, M. GARDIS, M. NARESH, K. MAKOROFF, S. WADE & T. RHINE. The influence of environmental factors on quality of life following TBI in very young children.

Objective: Traumatic brain injury (TBI) is a leading cause of childhood morbidity and can have pervasive long-term effects. Young children make up one of the two age groups with the highest incidence of TBI and may be at increased risk for poorer outcomes. However, this age group has been traditionally understudied. This study aimed to contrast health related quality of life (HRQOL) between children ages 0-4 years

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who have sustained a TBI or orthopedic injury (OI), and to investigate the potential moderating effects of environmental factors.
Participants and Methods: Caregivers of 53 children who sustained a TBI (n = 32) or OI (n = 21) aged 0-4 years and presented to the emergency department participated in a prospective cohort study of outcomes over the initial 6 months post injury. To investigate the impact of environmental factors on HRQOL, caregivers completed the Family Assessment Device (FAD) and Pediatric Quality of Life Inventory (PedsQL) as part of follow-up visits at one and 6 months post-injury. Linear regression was performed to investigate main effects, and moderation analyses were used to interpret interactions.
Results: The overall PedsQL and FAD scores did not differ between groups. There was a significant interaction between family function and visit, where family functioning was inversely related to HRQOL ($F(1,40) = 13.49$, $p < .001$), with effects diminishing with time since injury ($F(1,40) = 6.11$, $p = .02$). An interaction of family functioning, injury group, and visit trended towards significance ($p = .098$); caregivers of children with TBI and low family functioning reported the lowest HRQOL.
Conclusions: Although we did not find TBI associated difficulties in HRQOL, there was a clear indication that family functioning was influential on quality of life. Additionally, results suggest that the effects of poor family functioning may be exacerbated by TBI. Improving family functioning in children with TBI may improve HRQOL beyond what is seen over time.
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Symposium 11. Patient-Reported Outcomes (PROs) in Neuropsychology Research and Practice: Bridging Test Data and Lived Experience

Chair and Presenter: Susan Vandermorris

Presenters: Angela K. Troyer, Laura Rabin, Brian Levine, Komal Shaikh

1:45–3:15 p.m.

S. VANDERMORRIS, A.K. TROYER, J. RICH, L. RABIN, B. LEVINE, K. SHAIKH & E. TATHAM. Patient-Reported Outcomes (PROs) in Neuropsychology Research and Practice: Bridging Test Data and Lived Experience.
Good patient-centered care demands attention to patients' perceptions of their health and experiences. Patient-reported (or participant-reported) outcomes (PROs) are assessment tools that aim to capture the patient's perspective on symptoms, well-being, quality of life, etc., unfiltered by the lens of the clinician or researcher. The field of medicine has seen increasing calls for inclusion of PROs in clinical trials (Mehran et al., 2018), stemming from increasing recognition of the potential disconnect between objective measures of biological health (e.g., laboratory tests, brain scans) and the patient experience of illness (Calvert et al., 2018). The field of psychology, on the other hand, has a long history of investigating such phenomena, including a major tradition of exploring points of overlap and disconnect between performance-based (or objective) measures of cognition and participant-reported (or subjective) measures of the same. This symposium presents work at the interface of neuropsychology and medicine, showcasing how the theoretical and psychometric rigor of neuropsychology research is well suited to make important contributions to evidence-based, person-centered care. This includes applications of PROs in memory research and practice, reporting new findings and lessons learned from studies related to tool development (Troyer & Rich), evaluating intervention impact (Vandermorris), making diagnoses and predicting outcomes (Rabin), and deepening our understanding of neuropsychological phenomena (Levine, Shaikh & Tatham).
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A.K. TROYER, L. LEACH & J. RICH. What Makes a Good PRO? A Systematic Review and Meta-Analysis of Measurement Properties of the Multifactorial Memory Questionnaire.
Objective: The Multifactorial Memory Questionnaire (MMQ) is a participant-reported outcome assessing multiple aspects of metamemory. Since its initial validation with healthy older adults in 2002, it has been used with diverse clinical populations for a variety of descriptive and evaluative purposes and has been validated in several languages. We sought to summarize and critically appraise the quality of the measurement properties of the 3 MMQ scales across different study settings and populations.
Methods: A systematic review and meta-analysis were conducted according to PRISMA and COSMIN guidelines. We searched multiple databases to find studies providing information about MMQ reliability and/or validity. Of 112 identified articles, 29 met inclusion criteria. Relevant data were extracted, methodological quality was rated, and data were synthesized using meta-analysis or by narrative summary.
Results: Across studies, there was consistent evidence of separate factors for memory satisfaction and appraisal of one's memory ability; there was mixed evidence suggesting either 1 or 2 strategy factors. The 3 original MMQ scales showed good to excellent internal consistency, aggregate αs > .87, and high test-retest reliability, aggregate rs > .88. MMQ scores showed large correlations with scales measuring similar constructs, rs > .51, adequately discriminated known groups, ds > 0.7, and were variably responsive to interventions targeting metamemory, ds > 0.3.
Conclusions: The MMQ shows good measurement properties, including multiple measures of both reliability and validity, across 29 studies using different populations, languages, and settings. There is a need for additional research to determine the best factor structure. This participant-reported measure may be useful for clinicians interested in assessing their patients' memory appraisals and for measuring efficacy of interventions aimed at increasing compensatory memory strategies or changing one's attitude toward memory.
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L. RABIN, R. JONES, D. TOMMET & S. SIKKES. Using Patient-Reported Outcomes (PROs) for Early Detection: Subjective Cognitive Decline in Preclinical Alzheimer's Disease.
Objective: Subjective cognitive decline (SCD) in older adults, in the absence of objective cognitive dysfunction, may be a harbinger of non-normative cognitive decline and eventual progression to dementia. Moreover, there is ample evidence of associations of SCD with Alzheimer's disease biomarkers. Given that early detection of persons at risk is critical for instituting effective preventive strategies for cognitive decline and dementia, understanding SCD is of strong importance to clinicians and researchers. There is great variation, however, in key features of patient reported outcomes (PRO) currently used to ascertain and classify SCD.
Methods: The Subjective Cognitive Decline Initiative (SCD-I) Working Group is an international consortium established to develop a conceptual framework and research criteria for SCD (Jessen et al., 2014). In recent SCD-I studies, we: (1) systematically compared cognitive self-report measures used by 19 cohort aging studies, representing 8 countries and 5 languages; and (2) linked SCD measures using item response theory methods.
Results: We analyzed items from 34 PROs (>600 items). Approximately 75% of outcomes were used by a single study; wide variation existed in the types of measures used, item content and format, scaling, and

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timeframe of response options. Memory was the domain most frequently sampled, followed by executive function (58 and 16%, respectively). Instrument selection decisions were often guided by practical reasons (e.g., availability and brevity), raising questions about their validity for the study of SCD. We successfully linked item-level data from ten studies.
Conclusions: We discuss the challenges of harmonizing SCD measures and implications of our results for instrument choice in clinical research pursuing the topic of SCD. Ultimately, we seek to contribute to the development of brief screening tools for SCD that have strong psychometric properties and that associate with biomarkers and/or clinical progression.
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C. FAN, L. LEVESQUE, L. OLIVA, T. YU, K. ROMERO & B. LEVINE. Self-Reported Remote Memory Abilities and their Relationship to Cognitive Aging.
Individuals differ in how they remember the past—some tend to recall only the gist of an event, whereas others richly re-experience specific details. At the extremes, those with highly superior autobiographical memory (HSAM) are able to recall copious details from past experiences, whereas those with severely deficient autobiographical memory (SDAM) are unable to recall any. The Survey of Autobiographical Memory (SAM) is a self-report measure developed to assess trait mnemonics along the normal spectrum of memory abilities between these two extremes. While memory decline is a hallmark of cognitive aging, these trait-level individual differences in memory abilities have not been considered in cognitive aging research. Given the functional decline that accompanies memory deficits, one might expect that those endorsing high trait-level episodic memory would be less impaired—but we hypothesized that individuals with lower episodic memory abilities would report less age-related functional decline. We reasoned that those who have relied on congenitally strong episodic memory throughout life must newly adjust to age-related memory decline, whereas those with lower episodic memory abilities enter aging prepared with compensatory strategies. We tested 1144 older adults in an online battery that included the SAM and self-reported measures of daily function. As predicted, we found that trait mnemonics moderated the relationship between age and cognitive function in daily life, such that lower self-reported episodic memory abilities were associated with less age-related functional decline. Importantly, when we examined the relationship between age and function without accounting for individual differences in autobiographical memory, no clear associations emerged. These findings emphasize the importance of considering individual differences when studying cognitive aging trajectories and have clinical implications for age-related memory impairments and neurodegenerative disease.
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K. SHAIKH, E. TATHAM, T.S. PATERSON, J. RICH, S. VANDERMORRIS, K. STOKES, M. FREEDMAN & A.K. TROYER. An In-Depth Look at the Experience of Memory Change in Healthy Aging and Mild Cognitive Impairment.
Objective: Changes in memory can impact our daily lives and how we perceive ourselves. This study aims to determine whether reduced performance on objective measures of cognition is associated with a greater impact of memory changes on day-to-day functioning and sense of normalcy, and whether there is a relationship between these two participant-reported measures.
Participants and Methods: Sixty-nine community-dwelling older adults were recruited, including 24 healthy controls and 45 individuals with amnestic mild cognitive impairment. Composite scores were constructed for delayed memory and executive functioning from a full neuropsychological assessment. Participant-reported measures included the Memory Impact Questionnaire (MIQ), in which higher scores reflect greater negative impact of memory changes on everyday life, and the Subjective Normalcy Inventory (SNI), in which higher scores indicate a greater sense of normalcy about one's cognition.
Results: Delayed memory and executive abilities were independently related to SNI scores when controlling for mood, $r(64) = .38$, $p < .01$, and $r(64) = .31$, $p < .01$, respectively, but were unrelated to MIQ scores, $r(63) = -.21$, *ns*, and $r(63) = -.26$, *ns*, respectively. SNI scores were negatively associated with total scores on the MIQ, $r(67) = -.71$, $p < .001$.
Conclusions: Assessments of normalcy were related to objective cognitive measures, suggesting that participants made accurate appraisals of their cognitive abilities when comparing their experience to their peers. The results also suggest that the impact of memory changes on day-to-day functioning may be more dependent on other factors, such as how participants' view and approach these changes, rather than their objective abilities. Finally, a greater sense of normalcy was associated with a reduced negative impact of memory changes in everyday life. Addressing one's feeling of being different from others may reduce the negative burden of cognitive changes on everyday life.
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R. HUDES, J. RICH, A.K. TROYER, I. YUSUPOV & S. VANDERMORRIS. Using Participant-Reported Outcomes (PROs) to Evaluate Interventions: A Systematic Review and Meta-Analysis of the Impact of Memory Intervention Programs in Healthy Older Adults.
Objective: There are a number of neuropsychological interventions that have been developed to target and reduce the impact of common age-related memory problems. Many such programs have shown benefits on objective tests of memory, but there is little evidence of benefit to everyday functioning. Several factors beyond objective memory performance have been linked to everyday memory functioning, such as meta-memory (i.e., knowledge, beliefs and perceptions regarding one's own memory) and mood, and these may be best captured using participant-reported outcomes.
Participants and Methods: A systematic review and meta-analysis were conducted to examine whether memory intervention programs improve participant-reported outcomes in persons with age-related memory changes. Of 536 identified articles, a total of eighteen randomized control trials published since 1992 met the inclusion criteria for the review. Each included study was systematically appraised for potential risk of bias. Fourteen studies were included in the meta-analyses
Results: Results showed that memory interventions consisting of strategy training with or without supportive elements were effective at improving participant-reported memory ability (d=.43, p=.03), memory self-efficacy (d=0.82, p=.03), memory strategy use (d=0.45, p<.001), and memory-related affect (d=0.79, p=.03), as well as global measures of mood (d = 0.30, p = .03) and quality of life (d=0.42, p=< .001. No significant effect was found for participant-reported measures of everyday function; though such outcomes were not a focus of most studies.
Conclusions: Memory strategy training interventions have a meaningful perceived impact on healthy older adults experiencing age-related memory changes. Future research utilizing stronger study designs (i.e., representative sampling, blinding of participants and study staff) and more closely investigating everyday functional impact is needed.
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Symposium 12. Biopsychosociocultural Considerations for Updated Criteria in the Diagnosis of HIV-associated Neurocognitive Disorder: An International Discussion

Chair and Presenter: Monica G. Rivera Mindt

Discussant: Desiree A. Byrd

Presenters: Robert H. Paul, Uraina Clark, Sean Rourke, Lucette A. Cysique

1:45–3:15 p.m.

M.G. RIVERA MINDT, R.H. PAUL, U. CLARK, S. ROURKE, L.A. CYSIQUE & D.A. BYRD. Biopsychosociocultural Considerations for Updated Criteria in the Diagnosis of HIV-Associated Neurocognitive Disorder: An International Discussion.
Despite combined antiretroviral treatment (cART), HIV-Associated Neurocognitive Disorders (HAND) prevalence remains high. Updated research nosology for HAND diagnosis were introduced in 2007 to support a common framework for clinical investigations in the post-cART era (Antinori et al., 2007). Unfortunately, the neuropathogenic mechanisms & neural substrates of HAND remain unknown, and confusion exists regarding the cognitive phenotype of HAND. Studies have not consistently delineated the influence of viral, host, & psychosocial factors on brain integrity across the lifespan in people living with HIV (PLWH). And despite extensive HAND research, there is limited knowledge on the "lived experience" of how PLWH cope with and get support for HAND. The diagnostic challenge of HAND is further complicated by the high prevalence of comorbid conditions (e.g., psychiatric symptoms, substance use). Further, methods to assess HIV-related cognitive & functional impairment have not been optimized, particularly when applied to those in high-income countries who are disproportionately impacted by HIV (e.g., African Americans, Latinx, Indigenous peoples) and those in resource-restricted settings. As such, this symposium will highlight cutting-edge research from a biopsychosociocultural perspective to inform the updated HAND criteria efforts that are underway, including: 1) Neuropathogenic mechanisms & biomarkers of HAND; 2) Neuropsychiatric vulnerabilities that increase risk of HAND, including early life stress; 3) Psychosocial factors affecting how people experience & manage HAND; 4) Health disparities & sociocultural considerations in HAND; and 5) Cross-cultural cognitive assessment. Recommendations include greater attention to clinical translation, biometrics, methods harmonization, & cross-cultural validation. This symposium includes members of the International HAND Task Force charged with revising the current diagnostic criteria & offers great synergy with the 2019 INS theme.
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R.H. PAUL. Neuropathogogeneic Mechanisms and Neural substrates for HAND Criteria.
In the absence of a cure, the burden of HIV-related cognitive dysfunction will escalate in the ART era. There is a strong need to identify biometrics to identify those at risk of HIV-related cognitive impairment. Traditional markers of immune function (e.g., HIV viral load, CD4 T cell count) do not correlate well with cognition. Further, while nadir CD4 is believed to represent a static risk variable for cognitive impairment, the degree of correspondence is often weak at best. Further, studies of viral clade demonstrate similar cognitive phenotypes in HIV clades C and B, despite clade-C specific polymorphisms in genes that code for viral proteins known to mediate HIV clade B neuropathogenesis. Alternative immune subtypes of HAND that merit further study include the monocyte activation marker soluble CD163, which tracks with expression and amelioration of cognitive impairment, increased levels of CD16 expressing monocytes, and the loss of CCR2 expressing non-classical monocytes. Chemokine co-receptor tropism may also impart unique risk for HAND, but additional studies are needed.
This presentation will examine emerging research on the integration of laboratory markers with advanced neuroimaging (e.g., free water diffusion) and novel data analytic methods (e.g., artificial intelligence). An integrative multi-modal approach is necessary to determine whether the cognitive pattern of HIV has shifted towards a mixed cortical-subcortical phenotype *vs*. an entrenchment of the subcortical phenotype due to comorbidities (e.g., cerebrovascular disease). Combinations of lab-based measures and advanced neuroimaging methods hold promise to improve the diagnostic accuracy of HAND.
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U. CLARK. Early-Life Stress Exposure: A Biopsychosocial Comorbidity with Potential Relevance to HIV-Associated Neurocognitive Disorders.
We are living in an era in which HIV infection and exposure to high levels of early-life stress (ELS) are considered syndemic. In the United States and across the globe, the HIV epidemic is rooted in a context of poverty and inequality. Consequently, HIV-seropositive adults as a group are more likely than their HIV-seronegative peers to have a history of high ELS exposure. It is well documented that high ELS exposure can have pathological effects on the brain, with ELS-related effects overlapping substantially with regions that are also affected by HIV. Such findings point to the importance of teasing apart the independent and combined effects of HIV and high ELS on brain functions. Yet, ELS exposure has received relatively little attention in the NeuroAIDS literature, despite evidence of its potential relevance to the neuropathogenesis and diagnosis of HIV-Associated Neurocognitive Disorders (HAND).
This presentation will provide an overview of findings from a burgeoning line of research demonstrating that high ELS exposure contributes to neurocognitive, neuropsychiatric, and neuroimaging abnormalities in HIV-seropositive adults. In addition, novel data regarding the potential differential effects of specific types of childhood adversities on neurocognitive and neuropsychiatric symptoms will also be discussed. Taken as a whole, findings from this line of research suggest that by including biopsychosocial experiences such as high ELS exposure in our current conceptualization of the potential comorbidities that are relevant to HAND, we may improve our ability to more precisely delineate, investigate, and treat neurocognitive and neuropsychiatric symptoms in HIV-seropositive individuals.
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S. ROURKE. "I'm Just Forgetting and I Don't Know Why": Exploring How People Living With HIV-Associated Neurocognitive Disorder View, Manage, and Obtain Support for Their Cognitive Difficulties.
HIV-associated neurocognitive disorder (HAND) is common, but the "lived experience" of HAND is not well- understood. This disconnect presents major challenges to the effective clinical translation of HAND diagnosis and subsequent treatment. To address this issue, our descriptive qualitative study explored how adults with HAND view, manage, and obtain support for cognitive difficulties. We interviewed 25 participants (20% female; median age = 51 years) who were diagnosed with HAND using neuropsychological assessment and a clinical interview. Semi-structured interviews, co-developed with community members living with HIV, focused on how cognitive difficulties manifested and progressed, impacted well-being, and were discussed with others. We analyzed interview transcripts using a team-based, thematic approach. Participants described concentration, memory, and multitasking difficulties that fluctuated over time, as well as potential risk factors (both modifiable and non-modifiable ones), management strategies

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(compensatory strategies – spontaneous, systematic, and remediation), and psychosocial consequences (changes in emotional being, enacted and self-stigma, and social connectedness). They reported they seldom discussed cognitive impairment with their health care professionals, and often were not asked about these difficulties, but that receiving a HAND diagnosis in context of a neuropsychological assessment was validating, informative, yet somewhat disconcerting. The results of this study suggest that conversations between health care professionals and people living with HIV about HAND may enhance the clinical translation of HAND diagnosis and treatment through the provision of opportunities for psychoeducation, assessment, and support.
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M.G. RIVERA MINDT, D.A. BYRD, E.P. MORRIS, K. TURESON, V. GUZMAN, A.C. SUMMERS, C.L. CROOK & M.J. SAVIN. HIV Health Disparities & Sociocultural Considerations for the Diagnosis of HIV-Associated Neurocognitive Disorders in Diverse Populations.
The prevalence of HIV-Associated Neurocognitive Disorder (HAND) remains high despite the emergence of improved antiretroviral therapies over the last 20 years. Concurrently, the prevalence of HIV among underrepresented minority (URM) populations in the U.S. is also high. African American and Latinx persons living with HIV (PLWH) comprise 30% of the U.S. population, but ~70% of HIV diagnoses in the U.S. (Centers for Disease Control [CDC], 2018). Moreover, some PLWH from URM backgrounds demonstrate worse health and neurologic outcomes compared to their non-Hispanic white counterparts. These disparities are further complicated by debate in the field regarding the validity of diagnosing HIV-associated Neurocognitive Disorder (HAND) in URM populations given the limited research on culturally-relevant neurocognitive assessment, the role of sociocultural factors in test performance, and the paucity of appropriate normative data. As such, researchers and clinicians alike face significant challenges to diagnosing HAND in culturally diverse PLWH who comprise the majority of new HIV cases in the U.S. Although limited, a growing body of literature has examined HIV and neurocognitive outcomes among African American and Latinx populations. In contrast, there is a dearth of literature on HAND among other URM populations (i.e., Asian, Native Hawaiians, Pacific Islanders, American Indians/Alaskan Natives). The aims of this presentation are to: 1) provide a review of health disparities in HAND among URM adult PLWH; 2) present new research on sociocultural predictors of HAND; 3) offer recommendations for an empirically-based approach for the integration of sociocultural factors into updated HAND diagnostic criteria; and 4) discuss future research directions to improve neurocognitive assessment and outcomes in culturally diverse PLWH.
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L.A. CYSIQUE. Optimally assessing neurocognitive function in HIV-positive Culturally and Linguistically Diverse (CALD) Australian Populations.
People from Culturally and Linguistically Diverse (CALD) backgrounds in Australia experience a disproportionately high burden of HIV. CALD people originate from high HIV prevalence countries where HIV and sexual minorities are stigmatized, where HIV is diagnosed late and not always optimally treated. Often, CALD Australian HIV people are asylum seekers who carry a history of trauma linked to chronic mental health issues. CALD HIV people may be at greater risk for HIV-associated neurocognitive disorder (HAND). However, no study to date has provided an estimate of the prevalence of HAND in any CALD population in Australia. Our capacity to determine HAND burden in these communities is complicated by a lack of appropriate testing methods and measures designed for use among CALD individuals. In the absence of such tools, clinicians may fail to identify patients with HAND and thus fail to provide appropriate care. This represents an issue of equity of access to neurological care that is otherwise well developed for Australians with HIV. To start to remedy this issue, we launched a study which aims to develop and validate a novel neuropsychological testing protocol (combining existing cross-culturally valid tests) that is sensitive to HAND among HIV people from English Speaking Backgrounds, but also in CALD HIV people. The battery includes a screening and comprehensive phase. The testing accommodates for varying levels of education, literacy/numeracy and can accommodate minimum levels of English. Besides major demographic factors, it includes the assessment of sociocultural factors that are needed to precisely interpret neurocognitive performance, including: psychological health, independence in daily life activities, quality of education, acculturation, languages spoken and, social support. Currently the study has assessed 44 participants and it will be closed to data collection in December 2018. We will then be able to present the first study results for this symposium.
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PM Coffee Break

3:15–3:30 p.m.

Poster Session 8. MCI & Dementia

3:30–4:45 p.m.

Aging

N. BOTT & N. HANTKE. Composite cognitive performance characteristics of superagers in a population-based sample.
Objective: Superagers (SA) represent a minority of older adults with superior episodic memory performance comparable to peers 20 years younger. Previous studies have identified SA in small research cohorts and have shown that SA have larger cortical thickness in frontal regions, larger hippocampal volume, and fewer white matter hyperintensities. These brain regions have been associated with learning, memory, processing speed (PS) and executive function (EF). We aimed to identify and characterize SA comprehensive cognitive performance (CCP) across these domains in a population-based cohort of cognitively normal older adults.
Participants and Methods: We constructed CCPs across the domains of learning (4 tasks), memory (7 tasks excluding free recall), PS (2 tasks) and EF (5 tasks) and compared them in 24 SA and 283 CN older adults aged 70 and older from the Aging, Demographics and Memory Study. T-tests and general linear models (GLMs) with and without population-based sampling weights accounting for age, gender, educational attainment, and race were used to investigate performance on CCP variables.
Results: There were no demographic or clinical differences between SA and CN participants aged 80 and older (ps>.1). SA CCPs were higher (high score = better performance) than same-aged peers across all domains ($ps<.05$). SA CCPs were also higher than all CN older adults after accounting for demographic and clinical variables ($ps<.05$). SA CCPs score remained higher using population weighted GLMs on learning and memory ($ps<.05$). PS and EF trended toward significance in adjusted models ($ps<.1$).
Conclusions: SA demonstrate superior generalized CCP in the domains of learning, memory, processing speed and executive function when compared to CN age-matched peers and CN older adults aged 70 and older. These differences were partially replicated using nationally representative population weighted analyses.

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N. BOTT & N. HANTKE. Superior error monitoring in superagers: evidence from a population-based sample.

Objective: Superagers (SA) represent a minority of older adults with superior episodic memory performance comparable to peers 20 years their younger. Previous imaging studies have demonstrated larger cortical thickness in the anterior midcingulate cortex, a region associated with performance and error monitoring. We sought to characterize and compare cognitive performance errors in SA and cognitively normal (CN) older adults.

Participants and Methods: We investigated composite cognitive performance errors (CCPE) in 24 SA (defined by superior episodic memory ability) and 283 CN older adults aged 70 and older from the Aging, Demographics and Memory Study (ADAMS), a supplement to the Health and Retirement Study. General linear models (GLMs) with and without population-based sampling weights accounting for age, gender, educational attainment, and race were used to investigate performance across CN and SA on a composite cognitive performance error variable including SDDT, Trails A & B, word list learning and recall intrusions and recognition false positives.

Results: There were no demographic or clinical differences between SA and CN participants aged 80 and older (ps>.1). SA CCPE score was lower than same-aged peers (F=6.4, p=.013). SA CCPE score was also lower than all CN older adults after accounting for demographic and clinical variables (F=6.9, p=.009). SA CCPE score remained lower than all CN older adults using population weighted GLM (t=2.3, p=.008).

Conclusions: SA demonstrate superior performance and error monitoring when compared to CN age-matched peers and a population-based cohort of CN older adults as operationalized through a CCPE score. These results are consistent with previous neuroimagings findings implicating the anterior midcingulate cortex and suggest that superior performance and error monitoring may play a significant role in overall SA cognitive performance.

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N. BOTT & N. HANTKE. Decreased risk of cognitive decline in superagers: evidence from a population-based sample.

Objective: Superagers (SA) represent a minority of older adults, who enjoy an unusually successful cognitive aging trajectory. Previous studies have shown SA have larger brain volumes and retain superior cortical and white matter integrity over time. However, longitudinal cognitive outcomes of SA remain understudied.

Participants and Methods: We investigated longitudinal clinical diagnostic outcomes in 16 SA (defined by superior episodic memory ability) and 198 cognitively normal (CN) older adults aged 70 and older from the Aging, Demographics and Memory Study. We used chi-square to compare conversion from cognitively normal to either Cognitive Impairment no Dementia (CIND) or dementia at follow-up between 36 and 48 months among SA and CN older adults 80 years of age and older. To investigate the effect of SA designation on cognitive status conversion among all CN older adults a binary logistic regression was performed accounting for age, gender, educational attainment, race and APOE e4 carrier status.

Results: There were no demographic or clinical differences between SA and CN participants aged 80 and older (ps>.1). Compared with SA, a greater proportion of CN participants aged 80 and older converted to CIND or dementia at follow-up (47.1%; CIND n=18, dementia n=6) than SA (23.1%; CIND n=3) (c^2=4.1, p=.044). Among all CN, older adults were 84.8% Caucasian, had a mean age of 76.9(4.8) years, were 52.5% female, and 65.1% had at least a high school degree. SA were 93.8% Caucasian, had a mean age of 82.9(2.3), were 62.5% female, and 75.1% had at least a high school degree. Binary logistic regression accounting for these demographic variables and APOE e4 carrier status found SA status predicted stability of cognitive status (B=1.4, p=.047) at follow-up.

Conclusions: SA demonstrate superior cognitive stability over 36 to 48 months among their CN age-matched peers as well as among a population-based cohort of CN older adults 6 years younger.

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K. DENNY, M.L. CHAN, S. FARIAS, J. GRAVANO & O.J. HUSS. Objective Measures of Physical Exercise Among Older Adults in a Multidimensional Intervention to Promote Brain Health.

Objective: This study explored objective levels of physical activity with actigraphy monitors among older adults at before and after participating in a 10-week multidimensional intervention teaching everyday compensation strategies as well as the adoption of brain healthy lifestyles including physical exercise.

Participants and Methods: The 10-week intervention designed to promote participation in brain health activities (i.e., moderate to vigorous intensity physical exercise, cognitive stimulation, and meditation) and implement the use of compensation strategies (e.g., calendars, task lists, and organization systems) at the UCD Alzheimer's Disease Center. Data from a subset of participants (n=8; mean age=69.88) were used to evaluate change in physical exercise levels measured with actigraphy monitors. Analysis of covariance was used to assess for pre and post treatment differences in steps, and minutes of sedentary activity, light activity, moderate activity, and vigorous activity.

Results: There were no significant differences in pre and post treatment measures of physical exercise collected by actigraphy monitors including steps, or minutes of sedentary activity, light activity, moderate activity, and vigorous activity.

Conclusions: Our previous work showed while the intervention increased older adults' engagement in cognitively and socially stimulating activities and increased informant report of compensation use in daily life, self-reported physical exercise did not increase. Current findings further suggest that objective measures of physical exercise do not significantly change among older adults following a multidimensional intervention promoting physical activity through psychoeducation and in-class goal setting regarding physical activity. Results suggest that older adults have difficulty increasing physical activity, important implications for future intervention development that will need to incorporate in-class physical activity.

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C.C. HAYS, Z.Z. ZLATAR, M. MELOY, J. OSUNA & C. WIERENGA. APOE Genotype Modifies the Interactive Effects of Cerebral Blood Flow and Cortical Thickness on Memory in Cognitively Healthy Older Adults.

Objective: Advancing age is associated with cognitive decline, yet less is known about the neural basis of this change. Identifying risk factors and mechanisms of age-related cognitive decline represents one of the greatest challenges to improving the health of older adults. The ε4 allele of the apolipoprotein E gene (APOE) increases risk for cognitive decline in normal and pathologic aging. However, precisely *how* APOE ε4 exerts its negative impact on cognition is poorly understood. The present study aimed to determine whether APOE genotype (ε4+ vs. ε4-) modifies independent and/or interactive effects of frontal and medial temporal resting cerebral blood flow (CBF) and brain structure (cortical thickness (CT), volume (VO)) on cognitive performance.

Participants and Methods: Multiple linear regression models were employed to investigate relationships between APOE genotype, arterial spin labeling (ASL) MRI-measured CBF, FreeSurfer-based CT and VO,

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and neuropsychological performance (verbal memory, executive functioning) among a sample of 117 cognitively healthy older adults (41 ε4+, 78 ε4-) between the ages of 64 and 89 (mean age=73).
Results: Results indicated that APOE genotype modified the interactive effects of CBF and CT on memory in medial temporal regions, such that higher CBF and lower CT in the entorhinal cortex interacted to predict worse verbal memory performance in ε4 carriers but not non-carriers. APOE genotype was also found to modify the independent effects of medial temporal CBF, with higher hippocampal and entorhinal CBF being independently associated with worse verbal memory performance in ε4 carriers but not non-carriers.
Conclusions: Findings suggest that APOE genotype may confer risk for cognitive dysfunction through compensatory increases in medial temporal CBF. Moreover, results suggest that medial temporal cortical thinning may exacerbate the detrimental effects of APOE-related CBF alteration on cognition.
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Dementia (Alzheimer's Disease)

L. ABREU, M. ARCE RENTERÍA, J. FITZGIBBONS, N. SCHUPF, R. MAYEUX & J.J. MANLY. Relationship of Proximity to Parks and Green Spaces with Cognitive Function among Older, Urban Adults.
Objective: As urbanization increases, exposure to environments with green space decreases. Proximity to green space and parks is associated with better physical and mental health; but the association with cognition is unclear. We hypothesized that walkable proximity to green spaces (less than .1 mile from home) would be associated with better overall cognitive functioning and reduced prevalence of mild cognitive impairment (MCI) and dementia.
Participants and Methods: Participants were 2,063 older adults in a representative, community-based longitudinal aging study of residents of Washington Heights, Inwood, and Hamilton Heights (*M* age=75.2yrs; *SD*=6.7; 52% Hispanic; 67% women), who underwent a neuropsychological evaluation. Multiple regressions evaluated the main effects of proximity to green spaces on memory, language, visuospatial functioning, and processing speed. Logistic regressions evaluated the effect of proximity to green spaces on risk of cognitive impairment (MCI or dementia). All models adjusted for age, sex/gender, race/ethnicity, years of education, and childhood socioeconomic status.
Results: Proximity to green spaces was associated with older age, greater CVD burden, and lower income. In unadjusted models, proximity to a green space was associated with worse memory (β=.064, p = .007), but the effect was reduced in adjusted models (β=.030, p = .131). Proximity to green spaces was not associated with other cognitive domains, and was not associated with prevalence of MCI and dementia (OR = 0.84, 95% CI = .68 – 1.06).
Conclusions: In a cross-sectional analysis among older adults living in Northern Manhattan, walkable distance to parks was not associated with cognition nor did it reduce the risk of MCI or dementia. Future studies should include longitudinal cognitive outcomes, in order to better elucidate the causal relationships between proximity to green space and cognitive aging/dementia risk.
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S. ALLISON, E. JONAITIS, R. KOSCIK, L. CLARK, C. CARLSSON, H. ZETTERBERG, K. BLENNOW, H. ROWLEY, S. ASTHANA, B. BENDLIN & S. JOHNSON. Alzheimer's Disease Biomarkers, Neurodegeneration, and Longitudinal Verbal Learning and Memory Performance.
Objective: $Ptau_{181}/A\beta_{42}$, a cerebrospinal fluid (CSF) measure of Alzheimer-related β-amyloidosis and tau phosphorylation (a putative neuronal response to amyloid pathology), has been linked to cognitive decline in cognitively unimpaired (CU) older adults; less is known about its interaction with neurodegeneration (ND) measures. We examined the interacting effects of these markers on longitudinal verbal learning and memory performance in CU older adults.
Participants and Methods: 329 CU adults (mean age at baseline=58.6) completed 2-8 cognitive and 1+ biomarker visits. $Ptau_{181}/A\beta_{42}$ was calculated from CSF samples. ND was estimated using hippocampal volume (HCV) and global atrophy (GA; ratio of CSF to brain volume). Longitudinal verbal learning and memory were assessed using Rey Auditory Verbal Learning Test. Linear mixed effects models including covariates (centered age, education, sex, prior exposure to cognitive battery) and random effects (subject-specific intercept, age-related slope) examined the interactions among ND, $ptau_{181}/A\beta_{42}$, and age.
Results: HCV (β=.10, p=.02) and $ptau_{181}/A\beta_{42}$ (β=-.12, p<.01 when HCV in model; β=-.18, p<.001 when GA in model) were associated with greater learning decline. There was a three-way interaction for GA x $ptau_{181}/A\beta_{42}$ x age (β=.10, p=.02); individuals with both low $ptau_{181}/A\beta_{42}$ and GA (simple slope (SS)=.04) showed minimal age-related decline, whereas those with high values of either marker declined more steeply (high GA and high $ptau_{181}/A\beta_{42}$ SS=-.46; low GA and high $ptau_{181}/A\beta_{42}$ SS=-.52; high GA and low $ptau_{181}/A\beta_{42}$ SS=-.30). HCV (β=.45, p=.001) and GA (β=-.44, p<.01) were associated with worse delayed recall overall.
Conclusions: ND measures are associated with more learning decline and worse delayed recall overall. Our preliminary results suggest that individuals without AD biomarkers and GA have minimal learning decline when compared to those with AD biomarkers and/or GA; however, replication in other samples is needed.
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A.C. APPLE, J. YOKOYAMA, G. COPPOLA, A. WOLF, Y. COBIGO, A.M. STAFFARONI, K.B. CASALETTO & J. KRAMER. Greater Dorsolateral Prefrontal Cortex Volume is Related to Polygenic Risk Score in Healthy Older Adults.
Objective: Although *APOE*-e4 is the strongest genetic risk factor for Alzheimer's Disease (AD) there has been an increasing appreciation for the role of genetic variation with more modest risk effects on neurodegenerative disease and the prognostic significance when considering multiple variants aggregated as polygenic risk scores. This study aimed to understand the relationship between a polygenic risk score (PRS) for AD and brain volumes in healthy older adults. We selected the Dorsolateral Prefrontal Cortex (DLPFC) as our primary region of interest because of its known association with the longevity gene *KLOTHO* (Yokoyama, 2015).
Participants and Methods: Participants consisted of 33 *APOE*-e4-negative functionally intact older adults with a baseline brain MRI and polygenic risk score (PRS). Inclusion criteria were a Clinical Dementia Rating of 0, and no clinical consensus diagnosis of cognitive decline. Volume of DLPFC was calculated by combining the bilateral rostral middle frontal and caudal middle frontal gyri as labeled by the Desikan-Killiany Atlas. A PRS was created using PRSice software (Euesden, Lewis, & O'Reilly, 2015) applied to publicly available AD data to estimate AD risk.
Results: After controlling for age, sex and total intracranial volume, there was an inverse correlation between PRS and DLPFC volumes (partial r=-0.37, p=0.04).

Conclusions: The observed relationship between smaller DLPFC volume and higher PRS may suggest important associations between brain structures and risk for dementia even in healthy older adults. This may indicate that reductions in DLPFC volume may indicate greater dementia risk in *APOE*-e4-negative individuals. We propose that the PRS may be useful as a selection criterion for future trials in healthy older adults prior to the clinical onset of AD. This may be particularly true for trials in which brain volume is used as a surrogate endpoint.
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K.J. BANGEN, M. WERHANE, A.J. WEIGAND, E.C. EDMONDS, L. DELANO-WOOD, K. THOMAS, D.A. NATION, N.D. EVANGELISTA, A.L. CLARK & M. BONDI. Reduced Regional Cerebral Blood Flow Is Associated With Poorer Cognition In Older Adults With Type 2 Diabetes.

Objective: Type 2 diabetes mellitus (T2DM) increases risk for dementia, including Alzheimer's disease (AD). Magnetic resonance imaging (MRI) techniques that measure cerebral blood flow (CBF) may elucidate mechanisms that precede irreversible parenchymal damage and serve as a marker of risk for cognitive decline.
Participants and Methods: We examined associations among T2DM, CBF, and cognition in a sample of 49 well-characterized nondemented older adults. Participants completed a comprehensive neuropsychological assessment and MRI exam including a pseudocontinuous arterial spin labeling (PCASL) sequence optimized for older adults (i.e., increased post-labeling delays that allow more time for blood to reach brain tissue) to measure regional CBF.
Results: Results showed no significant differences between individuals with and without T2DM in terms of cortical thickness or regional brain volume. However, adjusting for age, sex, comorbid vascular risk factors, and reference CBF (postcentral gyrus) older adults with T2DM demonstrated reduced CBF in the hippocampus (p=.005) as well as inferior temporal (p=.007), inferior parietal (p=.001), and frontal cortices (rostral middle frontal gyrus: p=.004). Lower CBF was associated with poorer memory and executive function/processing speed (all ps<.05).
Conclusions: Results demonstrate that CBF is reduced in older adults with T2DM, and suggest that CBF alterations likely precede volumetric changes. Notably, relative to nondiabetic control participants, those with T2DM showed lower CBF in predilection sites for AD pathology (medial temporal lobe and inferior parietal regions). Findings augment recent research suggesting that perfusion deficits may underlie cognitive decrements frequently observed among older adults with T2DM. Results also suggest that CBF measured with ASL MRI may reflect an early and important marker of risk of cognitive impairment in T2DM and related conditions.
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E. BAYRAM, K.R. SREENIVASAN, A. RITTER, J.Z. K. CALDWELL & S.J. BANKS. Cognitive Correlates of Amyloid Deposition in Alzheimer's Disease.

Objective: Amyloid deposition is estimated to precede cognitive symptoms in Alzheimer's disease (AD), and a positive amyloid-Positron Emission Tomography (PET) scan is an early AD biomarker. Worse verbal memory performance has been previously associated with parietal amyloid deposition in AD. We investigated the relationship between various cognitive domains and regional amyloid deposition.
Participants and Methods: 21 cognitively normal controls, 27 mild cognitive impairment (MCI) and 4 Alzheimer's disease dementia patients were enrolled in the Center for Neurodegeneration and Translational Neuroscience. Using structural T1 images as a template, standardized uptake value ratios (SUVRs) from the florbetapir PET scans were obtained with the whole cerebellum as the reference region. Cognitive measures included Rey Auditory Verbal Learning Test (RAVLT); Brief Visual Memory Test; Benton Judgment of Line Orientation; Trail Making Test- Part B, Boston Naming Test; D-KEFS Verbal Fluency-Category Switching; and Wechsler Memory Scale-III Logical Memory, Story A. Association between voxelwise SUVR and cognitive measures was analyzed in the permutation analysis of linear models toolbox in FSL.
Results: Mean age was 72.5 (6.5), years of education was 15.8 (2.3), and 22 were female. Lower RAVLT-delayed recall score was associated with increased voxelwise SUVR in posterior cingulate, precuneus, frontal and temporal regions. Lower Story A-delayed recall score was associated with increased voxelwise SUVR in posterior cingulate. There were no other significant associations.
Conclusions: Increased regional amyloid deposition correlated with worse verbal memory but no other cognitive measures. Further analysis of associations between cognitive performance and other AD pathologies may help explain the underlying mechanisms of cognition in AD.
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D. BANUELOS, M. NAKHLA, A. GAVARRETE OLVERA & J. RAZANI. Different CVLT Subscales Predict Shopping Skills in Alzheimer's disease and Mild Cognitive Impairment.

Objective: Memory tests, such as the CVLT, are often administered when an individual experiences a memory complaint. The purpose of the study was to investigate the relationship between the aspects of memory assessed with CVLT (learning, episodic memory, semantic memory) and a mock shopping task in individuals with Mild Cognitive Impairment (MCI) and Alzheimer's disease (AD).
Participants and Methods: Performance of 55 AD and 46 MCI participants were administered the CVLT-II and Direct Assessment of Functional Status (DAFS) designed to assess activities of daily living. The CVLT trials were used as a measure of learning, the free delay recall was used as a measure of episodic memory, and the cued recall was used as a measure of semantic memory. The DAFS shopping task required learning a list of 6 shopping items, to be recalled 10 minutes later (free recall), followed by recognition of the items in a mock grocery store, and finally shopping for the items with the shopping list.
Results: Stepwise regression analyses were conducted separately for each groups, with CVLT subscales as the predictor variables and DAFS shopping subscales as the outcome variables. Results revealed that for the AD group, only CVLT free delay significantly predicted shopping free recall and recognition. In the MCI group, only CVLT total list learning significantly predicted shopping free recall. For the MCI group there was no significant CVLT predictor for shopping recognition; and for both groups, there was no significant predictor of shopping with a list.
Conclusions: These findings indicate that for the AD group, aspects of the CVLT measuring episodic memory best predict the recall of shopping items on a routine daily task. Yet, for the MCI group it was the CVLT learning trials that best predicted recall and recognition of the shopping items on the same daily task. This suggests that different aspects of memory play a role in the everyday activity of shopping for these two different groups.
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Y. BELLAALI. Do Differences Between Self- and Spouse-Evaluation of Cognitive Performance Signal Incipient Anosognosia and Predict Cognitive Decline in Healthy Older Adults?

Objective: Alzheimer's disease (AD) begins with slight memory and cognitive impairment, years before dementia onset. AD patients often suffer from ansosognosia, being unaware of their weaknesses or tending to minimize them. However, it is not known when this symptom appears in the development of the disease. In this retrospective study, we

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investigated an index comparing the evaluation of participants' cognitive performance by themselves and by their spouses as a surrogate marker of incipient anosognosia in a cohort of non-demented older adults.

Participants and Methods: In a cross-sectional analysis of data collected in 2005 from 5945 participants in the Wisconsin Longitudinal Study (average age 64, 54% male), we computed a discrepancy score between the evaluation of the participant's cognitive abilities by his or her spouse and by each participant himself or herself to establish an anosognosia score (AS). A negative AS was interpreted as a sign of anosognosia. In longitudinal analyses, we compared changes in objective cognitive performance between the 2005 and 2011 as a function of AS in 2005.

Results: The anosognosic participants were slightly older (64.6 vs 63.8 years old; p= 0.001), more likely to be male (84%; p< 0.0001), and had a lower high school IQ (100.3 vs 103.8 p <0.001). However, anosognosia significantly predict lower immediate and delayed recall performance in 2005, independently of demographic factors (R^2 adjusted= 9.3%; p=0.0001). Moreover, an AS score in the anosognosia range was an independent predictor of decline in memory and cognition in 2011 (R^2 adjusted=0.044 p=0.004).

Conclusions: Apparently cognitively normal older adults who tended to underestimate their cognitive performance the same way as do anosognosic AD patients have poorer memory and are more prone to cognitive decline six years later.

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A. BLANKEN & D.A. NATION. Women with higher systolic blood pressure variability are at increased risk of dementia.

Objective: Previous studies have reported an association between visit-to-visit blood pressure variability (BPV) and cognitive decline. The current study examined whether BPV was associated with hippocampal volume and progression to Alzheimer disease (AD) dementia in older men and women.

Participants and Methods: Seven hundred thirty-three non-demented, stroke-free older adult participants from the Alzheimer's Disease Neuroimaging Initiative (aged 55–89 years) underwent multiple blood pressure (BP) assessments (baseline, month 6, month 12). BPV was calculated as the coefficient of variance across measures, annual brain MRI quantified hippocampal volume. Pearson correlations and multiple linear regression controlling for age, sex, *APOE* genotype, and vascular risk factors, evaluated the relationship between BPV and hippocampal volume. Cox regression, controlling for age, sex, *APOE4* carrier status, and vascular risk factors evaluated the relationship between BPV and risk of AD.

Results: Higher systolic BPV was associated with smaller hippocampal volume at baseline and month 24 in women (baseline: $p = 0.008$; month 24: $p = 0.005$), but not men (baseline: $p = 0.950$; month 24: $p = 0.850$). Cox regression indicated an interaction between BPV and sex ($p = 0.023$) such that increased BPV was associated with greater risk of future dementia in women but not men.

Conclusions: BPV may convey greater risk of hippocampal volume loss and dementia in women. Risk of AD dementia is higher in women than in men, but the mechanisms underlying sex differences remain unclear. Studies findings suggest vascular factors may play a role in sex differences in dementia risk.

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Y. BOCANEGRA, E. GUZMAN-VELEZ, A. BAENA, A. ARTOLA, J. GATCHEL, E. PARDILLA-DELGADO, J.T. FULLER, R. SPERLING, K. JOHNSON, F. LOPERA & Y. QUIROZ. Visual Memory Performance is Associated with Markers of Brain Pathology in Preclinical Autosomal Dominant Alzheimer's Disease.

Objective: Visual memory (VM) declines early in Alzheimer's disease (AD). However, it is unclear how VM performance relates to markers of AD pathology accumulation—e.g. tau and amyloid pathology—in individuals who are known to be in the preclinical stage of the disease. In this study we examined the relationship between VM performance and markers of AD pathology in cognitively unimpaired individuals with autosomal dominant AD (ADAD) due to the presenilin-1 (PSEN1) E280A mutation.

Participants and Methods: Thirty-seven cognitively unimpaired individuals from a Colombian kindred with *PSEN1* E280A mutation (16 carriers and 21 age-matched non-carriers) were included. All participants underwent cognitive testing and PET imaging. A VM composite score was computed with the scores of the CERAD constructional praxis recall and the Rey Complex Figure immediate recall. Cortical amyloid accumulation was measured using PiB PET, and regional tau accumulation in the entorhinal cortex (EC) and precuneus (PCu) was measured using Flortaucipir F18 PET.

Results: The mean age of carriers was 35 years, approximately 9 years younger than the expected onset of clinical symptoms. There were no differences between groups in VM performance (p=0.40). Compared with non-carriers, mutation carriers had elevated levels of cortical amyloid ($p < 0.001$) and tau (EC: p=0.03, PCu: p=0.03). In mutation carriers, worse VM performance was associated with greater levels of tau (EC: r= -0.709, p=0.002; PCu: r= -0.694, p=0.002), but not with cortical amyloid (r= -0.49, p=0.06). No such relationships were significant in non-carriers.

Conclusions: Preliminary findings suggest that subtle changes in VM performance have a stronger association with regional tau pathology than cortical amyloid in preclinical ADAD, several years before symptom onset. Further investigation with larger samples is needed to confirm present findings, and to examine the potential usefulness of these cognitive measures for identifying those individuals at high risk to develop dementia later in life.

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S. BORISH, P. LITVIN, S. MASON, C. MARRIERO & L. SHAUGHNESSY. The Relationship Between Amyloid Status and Neuropsychological Profile in Ambiguous Cases: An Exploratory Analysis.

Objective: The utilization of in vivo β-amyloid(Aβ) positron emission tomography(PET) imaging increases diagnostic accuracy and maximizes care in complex and ambiguous cases. The relationship between neuropsychological profile and amyloid status in these cases has not yet been well characterized, nor have the neuropsychological characteristics that may have contributed to the initial referral. The objective is to determine which neuropsychological tests help differentiate between amyloid positive and negative participants with initially ambiguous diagnoses, while also providing insight into why these particular cases may have been more diagnostically challenging.

Participants and Methods: 24 diagnostically ambiguous patients were referred for Aβ PET imaging. 16 subjects had positive amyloid PET scans(A+), and 8 had negative(A-). All participants completed comprehensive neuropsychological assessment batteries; t-tests were used to identify significant differences between groups.

Results: No significant differences between groups were identified for age or education. No significant differences were observed on story or visual memory tasks. Three tests differentiated the samples: CVLT delayed free recall t(10)=-.544,p=.027 was lower in A- group; Trails B t(20)=-2.25,p=.012 and BNT t(21)=2.67,p=.027 were lower in A+.

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Affective measures (GDS/GAI) also approached significance(more severe in A+).
Conclusions: This was a single sample exploratory study of patients with etiological uncertainty, examined by dementia specialists. Given significantly lower delayed memory score in the A- group, in atypical cases episodic memory decline may not predict amyloid status. Rather, lower scores on semantic memory and set-shifting tasks were more indicative of Aβ positive status. A trend toward affective factors differentiating these groups was also noted, with higher symptoms associated with Aβ positive status. Future research should further explore the relationship between Aβ PET status and neuropsychological assessment in ambiguous cases.
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L. ZUROFF, J. BOVE, D. WOLK & D. MECHANIC-HAMILTON. Cognitive Decline and Subjective Memory Complaints: Patient and Informant Discrepancies.
Objective: This study aimed to better characterize the relationship between subjective memory complaints (SMCs), reported by patients and informants, and the likelihood of future cognitive decline in normal aging and cognitive impairment associated with Alzheimer's disease.
Participants and Methods: Participants included a total of 369 patient and informant pairs recruited from the Penn Alzheimer's Disease Clinical Core. Subjects included individuals with Normal Cognition, single-domain amnestic MCI, multi-domain amnestic MCI, Possible and Probable AD. Data on SMCs (Prospective and Retrospective Memory Questionnaire; PRMQ), everyday function (FRS), and global cognition (MMSE) was collected at yearly visits. Informant demographic information, relationship to the patient, and SMCs (PRMQ Proxy) were collected. PRMQ Difference scores (Self–Proxy) were calculated. Changes in MMSE and FRS over a 2-year period were measured to assess progression.
Results: Control and multi-domain amnestic MCI participants reported more SMCs than informants ($p<0.001$), while patients with Possible and Probable AD reported less SMCs than informants ($p=0.012$ and $p<0.001$). Informant demographics did not significantly influence SMC discrepancies within most diagnostic groups, with the exception of Probable AD, where higher education of informants correlated with more SMCs by the informant ($r=0.293$; $p=0.032$). Subjects who progressed over the two years had a greater degree of SMCs at baseline, as reported by both self ($p=0.03$) and proxy ($p=0.01$). Higher PRMQ proxy scores at baseline correlated with worsening MMSE ($r=0.434$, $p<0.001$) and FRS ($r=0.356$; $p<0.001$) scores. Similarly, higher PRMQ proxy scores at baseline correlated with greater decline, including worsening MMSE ($r=0.396$; $p<0.001$) and FRS ($r=0.374$; $p<0.01$), over 2 years.
Conclusions: In this preliminary analysis, a greater degree of SMCs rated by proxy and a greater discrepancy between patient and proxy at baseline, predicted worse cognitive and functional outcomes over a two-year period.
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S. BROTHERS, J.P. HARP, E.R. WALLACE, K. O'CONNOR, E. HEAD, F.A. SCHMITT & L.M. KOEHL. Detecting Dementia in Down Syndrome with the Severe Impairment Battery (SIB).
Objective: Objective: Down syndrome (DS) accelerates amyloid beta and tau deposition, increasing risk for Alzheimer's disease (AD). The SIB was evaluated for efficacy in classifying individuals with DS according to clinical AD diagnostic status.
Participants and Methods: Participants and Methods: Participants were from the Aging and Down Syndrome study at the University of Kentucky. Participants over age 40 completed the SIB and informants rated symptoms on the Dementia Questionnaire for Mentally Retarded Persons (DMR) (Age M = 49.74±6.16; 68.5% Female). Three groups were formed based on consensus diagnoses using cognitive, neurological, and MRI data: asymptomatic DS (aDS; n = 22), Possible Dementia (DS-MCI; n = 17), and Probable Dementia (ADDS; n = 15).
Results: Results: Levene's test and t-tests compared group differences. aDS significantly differed from DS-MCI on 5 of 9 SIB subscales (Memory, Orientation, Language, Attention, and Visuospatial) as well as on SIB Total ($p < .05$). DS-MCI and ADDS significantly differed on SIB Language and SIB Total. Moderate to strong correlations were found between DMR Cognitive and SIB subscales (excluding Social), particularly Language and Attention ($r = -0.61$, $r = -0.60$). SIB and DMR total scores were strongly correlated ($r = -0.62$). For aDS and ADDS, suggested DMR cut-scores produced a sensitivity of 60% and specificity of 95.50%. SIB Total cut-scores produced sensitivities ranging from 62.55% to 87.50% and specificities of 81.80% to 41.90%. Test operating characteristics for DS-MCI were notably weaker.
Conclusions: Conclusion: The strong correlations between DMR Cognitive and SIB subscales relating to cognitive function indicate the scales measure the same construct. While the DMR has superior specificity, the SIB's higher sensitivity makes it useful for identifying AD in the DS population.
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H.E. BRUNET, J.B. MILLER & J.Z. K. CALDWELL. The Relative Importance of Hippocampal Volume and Sex in Verbal Learning and Memory within a Clinical Sample of Older Adults.
Objective: Healthy older women exhibit an advantage in verbal memory, which appears to persist into early degenerative disease. This study aimed to determine sex differences in hippocampal volume (HCV) and examine the relative importance of sex and HCV in predicting memory in a mixed clinical sample of older adults.
Participants and Methods: Records from 249 patients seen at a memory clinic (age $M = 67.91$, years of education $M = 14.86$) were evaluated. The Hopkins Verbal Learning Test, Revised (HVLT-R) and the Brief Visuospatial Memory Test, Revised (BVMT-R) measured learning and recall. HCV was obtained using FreeSurfer version 6.0 and adjusted for total intracranial volume. An independent samples t-test was used to evaluate sex differences in HCV and multiple regressions were used to evaluate HCV, sex, education, and age as predictors of learning and recall.
Results: Men had significantly more education but the sexes did not differ in age, depression severity, or ethnicity. Consistent with our prior work, women outperformed men in total HVLT-R learning, $F(1, 246) = 4.21$, $p = .04$, and delayed recall, $F(1, 246) = 5.69$, $p = .02$. There were no sex differences in HCV, adjusted for intracranial volume. No sex differences were found for BVMT-R indices, thus regressions predicting nonverbal memory were not performed. Regression analyses revealed that HCV accounted for 7.3% of the variance in HVLT-R learning and 14.1% of the variance in HVLT-R delayed recall beyond variance accounted for by age, education, and sex. Sex accounted for 2.0% of the variance in HVLT-R learning and 2.8% of the variance in HVLT-R delayed recall beyond variance explained by age, education, and HCV.
Conclusions: Women in a mixed clinical sample of older adults show an advantage in verbal memory that cannot be accounted for by HCV. These results emphasize that sex is a significant, independent predictor of verbal learning and recall in older adults seen at a memory clinic and an important consideration in the diagnosis of memory disorders.
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A. BUCHHOLZ, B. BARRON, D. VIZTHUM, M. CERVENKA, C.J. ZOLLIECOFFER, O. OYENUSI, B. SHPRITZ & J. BRANDT. Improved Episodic Memory with the Modified Atkins Diet in Alzheimer's Disease.

Objective: This pilot study examined the effectiveness of a ketogenic diet (the modified Atkins diet [MAD]) in mild cognitive impairment (MCI) and early Alzheimer's disease (AD). We hypothesized that patients adherent to the MAD would demonstrate a significantly more favorable change on memory tests than patients on the National Institute on Aging's (NIA) diet for senior nutrition.

Participants and Methods: 14 patients with MCI or early-stage AD (i.e., MoCA score=18-25, and global CDR score=.5 or 1) who lived with a cognitively normal person have completed the study. Patients were randomly assigned to the MAD (N=9) or the NIA (N=5) treatment group. Participants met with dietitians to receive dietary instruction and then returned for follow-up visits including health checks, ketone testing, and dietary counseling after 3, 6, 9, and 12 weeks. Production of at least 5 mg/dL urine ketones urine at study visits was considered adherence to MAD. Neuropsychological testing, including the Hopkins Verbal Learning Test – Revised (HVLT-R) and Brief Visuospatial Memory Test – Revised (BVMT-R) was performed at baseline, week 6, and week 12. HVLT-R and BVMT-R delayed recall scores were combined to create a Memory Composite Score (MCS).

Results: The mean MCS of the MAD group increased slightly over the trial, while that of the NIA group declined slightly. However, the group-by-time interaction was not statistically significant ($F_{(2,24)}$=1.58, p=0.22, η_p^2=0.16). When the MAD group was divided by adherence at week-6, the subgroups differed in their MCS scores, such that the MAD adherent group showed improved MCS over time and the MAD non-adherent group's MCS declined (group-by-time interaction: $F_{(1,7)}$=7.75, p=0.03, η_p^2=0.53). A similar interaction at week-12 was not observed.

Conclusions: Patients with MCI and mild AD who adhere to a modified Atkins diet and achieve ketosis may display a trend towards improvement in episodic memory. Increasing our sample size will enable us to test our hypotheses with greater statistical power.

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X. CAO, K.R. THOMAS, C.G. WONG, S. COOPER, M. BONDI, D.R. GALASKO & D. SALMON. Differential Decline in Word Generation from Letter and Semantic Categories in Preclinical Alzheimer's Disease.

Objective: Mildly demented patients with Alzheimer's disease (AD) and patients with amnestic Mild Cognitive Impairment (MCI) are more impaired in generating exemplars from a specific semantic category (e.g., 'animals') than in generating words that begin with a particular letter (e.g., 'F'). This may reflect early decline in semantic knowledge required to efficiently generate words from a small, conceptually-related set of exemplars. We sought to determine if this discrepancy between category and letter fluency occurs during the preclinical stage of AD.

Participants and Methods: Participants were clinically normal elderly individuals in a longitudinal study with at least four annual neurological/neuropsychological evaluations. Sixty-five remained normal over all evaluations (NC). Forty-five were normal at baseline and remained so until diagnosed with amnestic MCI (n=10) or AD dementia (n=35) at the fourth evaluation (Preclinical AD). Semantic and letter fluency tasks were administered at each evaluation. Correct words generated in one minute from each category were summed across animals, fruits and vegetables (AFV), and 'F', 'A' and 'S' (FAS).

Results: Preclinical AD generated fewer words overall ($p < .001$), and declined faster on both fluency tests ($p < .001$) than NC. Moreover, Preclinical AD had significantly lower AFV, but not FAS, scores than NC 3 years and 2 years prior to a non-normal diagnosis. AFV performance was lower (based on normalized scores) than FAS in the Preclinical AD group, and this difference increased significantly as dementia approached. Logistic Regression showed good specificity (but poor sensitivity) for AFV alone, or for the AFV-FAS difference, in predicting dementia up to 3 years before a non-normal diagnosis.

Conclusions: Gradual deterioration of the content and organization of semantic memory occurs in preclinical stages of AD and is a potential cognitive marker for predicting incident MCI and AD in clinically normal elderly.

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K. CHAPMAN, P. MALLOY, G. TREMONT & M. SPITZNAGEL. Sexual Disinhibition and Family Caregiver Burden in Dementia.

Objective: Sexual disinhibition in dementia has been linked to caregiver distress in formal caregivers, but has not been closely examined in family caregivers. The current work examined group differences in caregiver burden between caregivers who either do (SD) or do not (NSD) report sexual disinhibition in their dementia care recipient. The contribution of sexual disinhibition, relative to other neuropsychiatric symptoms, to caregiver burden was also examined.

Participants and Methods: Participants were 827 informal caregivers recruited from social media dementia caregiver groups. The Zarit Burden Interview-8 measured caregiver burden, the Cohen-Mansfield Agitation Inventory measured neuropsychiatric symptoms, and 2 novel items assessed sexual disinhibition.

Results: 17.3% of caregivers reported sexual disinhibition; within this group, the majority reported low frequency of such symptoms (63.8-76.5% report symptoms <once per week). ANOVA revealed the SD group reported higher burden than the NSD group, $F(1, 821)$=16.74, p<.001. Hierarchical linear regression within the SD group revealed that frequency of sexual disinhibition significantly predicted caregiver burden $F(3, 139)$=5.34, p=.002, R^2=.10, but did not uniquely predict it when considered in a model including other neuropsychiatric symptoms (B=.19, SE=.15, β=.09, p=.19).

Conclusions: While sexual disinhibition contributed to burden in family caregivers, it did not predict burden above and beyond other neuropsychiatric symptoms. It is possible that frequency of sexual disinhibition in the current sample was insufficient to predict burden in the context of other more frequently endorsed symptoms, or that items assessing sexual disinhibition did not sufficiently capture its presence. Future work should compare different ways of asking about sexual disinhibition and re-examine the current question in a sample that demonstrates greater range in frequency of sexual disinhibition.

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A.N. DE VITO & M. CALAMIA. Further Evidence That Year-to-Year Variability in Performance is an Early Sign of Cognitive Impairment.

Objective: The current study aimed to replicate and extend past findings that year-to-year variability in cognitive performance differs between individuals who remain cognitively stable compared with those who subsequently develop dementia.

Participants and Methods: Participants were 374 individuals diagnosed with dementia and 374 age- and sex-matched controls from the Memory and Aging Project (MAP; Age M= 82.80, SD=5.83; 74% female). Longitudinal performance was examined using measures of global cognitive status, attention, memory, language, and executive functioning. For those diagnosed with dementia, data from baseline to 5 years prior to cognitive impairment to focus on variability before the onset of significant decline. Two linear mixed effects models were used to determine differences in cognitive variability between groups over time. The first model assumed that assumed that within-person variability did differ between groups over time whereas the second model assumed that the within-person variability did not differ between groups

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over time. Likelihood ratio tests were used to determine which model demonstrated better fit.
Results: Individuals who were later diagnosed with dementia demonstrated greater year-to-year variability than cognitively stable participants on measures of global cognitive status, attention, language, executive, and most aspects of memory at least 5 years prior to the onset of cognitive impairment (i.e., p's < .05). There was no difference in variability between those who subsequently developed dementia and those who remained cognitively stable on a task of delayed recall for prose passages (i.e., $p > .05$).
Conclusions: These results largely replicate and extend findings by Gamaldo and colleagues (2012) using an independent sample and partially overlapping cognitive battery. Year-to-year performance variability may be a useful tool in the early identification of individuals who may develop future cognitive impairment.
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S. DEMETROPOLIS, R. GOLDFARB, M. RANDAZZO, L. KOENIG & R. KHAMIS-DAKWAR. Semantic memory processing in early stage Alzheimer disease: Behavioral and electrophysiology evidence.
Objective: The purpose of this study was to investigate the semantic breakdown at the word-class level (nouns, verbs, adjectives) in the early-stage of Alzheimer disease (AD) using both behavioral and electrophysiological (EEG) measures.
Participants and Methods: Testing included the standardized tests of the Arizona Battery of Communication in Dementia (ABCD) and semantic memory skills in pictures versus words with the Pyramids and Palm Tree (PPT) test. The EEG testing examined word associations of a picture and auditory word (i.e., adjective, noun, verb) in a semantic priming paradigm to show whether the degree of the deficit depended on word class. EEG results were from a group of adults who have a diagnosis of early-stage (i.e., mild) AD compared to a comparison group of adults who had typical language and cognitive skills.
Results: The participants with AD performed significantly poorer on the subtests of the ABCD as compared to the comparison group. The individuals with AD performed poorer on the picture condition of the PPT versus the word condition. Accuracies for the EEG experiment revealed that the AD group was significantly less accurate than the comparison group with a significant main effect for word classes and the descriptive level being less accurate than category and function levels. Response time with and without the outliers showed similar patterns with the congruency effect being significantly larger in the verb condition than in the category condition. The EEG results revealed an N400 for congruency for the comparison group and a reduced N400 for the AD group. There is a late positivity component (LPC) seen predominantly in the AD group with a sensitivity for category and function and a negativity for the descriptive level in the incongruent condition.
Conclusions: These findings reveal a breakdown in the attribute level in the early stage of the disease. The response time data did not align with this finding. There was also a LPC seen in the AD group that should be further explored in future studies.
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H. DING AND N. AN, T. ANG, S. DEVINE, A. SANFORD H, J. MASSARO & R. AU AND H. LIN. A data-driven approach to designing stepwise diagnostic rules for Alzheimer's disease from neuropsychological tests: the Framingham Heart Study.
Objective: Despite the availability of age- and education-adjusted standardized scores for most neuropsychological tests, there are still a lack of clear rules and discrete cut-off values for the diagnosis of Alzheimer's disease (AD) using results of multiple neuropsychological tests concurrently. We endeavored to develop a systematic multi-level diagnostic decision tree and perform feature selection to identify the most informative NP tests related to the neurodegenerative diagnoses.
Participants and Methods: We used data from 2091 Framingham Heart Study participants (mean age 80±7, 55.8% female). First, Chi-square Automatic Interaction Detection (CHAID) decision tree was applied to derive the clinical diagnostic rules for AD. Second, a discretization method was used to determine sets of cut-off scores for NP tests of interest. Finally, three feature selection methods were applied to evaluate the importance of tests.
Results: A series of stepwise AD diagnosis rules from NP tests were generated as an intuitive and objective method for AD diagnosis that exceeded 80% accuracy. As expected, Logical Memory – Delayed Recall was found as the most important performance indicator for AD diagnosis. The Boston Naming Test was a more important performance indicator for men compared to women, but the opposite sex-related direction was observed for Paired Associate Learning and Visual Reproductions – Delayed Recall.
Conclusions: The resultant diagnostic criteria consists of a set of if-then rules which can be translated for diagnosing AD in a clinical setting, thereby minimizing subjectivity in practitioners' decision-making. Feature selection was able to identify the most informative NP tests and distinguish that between sexes.
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A. ECONOMOU, D. PAVLOU, I. BERATIS, G. YANNIS & S. PAPAGEORGIOU. Intraindividual Variability Within and Across Conditions in Driving Simulator Measures of Neurology Patients and Healthy Drivers.
Objective: To investigate intraindividual variability of simulator measures in different driving conditions in neurology patients compared to controls.
Participants and Methods: Participants were active drivers who completed all four rural (R) and urban (U) simulation conditions. There were 43 controls over 38 years (age of youngest patient), 37 mild cognitive impairment (MCI) drivers, 16 Alzheimer's disease (AD) drivers, and 15 Parkinson's disease (PD) drivers in R conditions; 33 controls, 28 MCI drivers, 8 AD drivers, and 10 PD drivers in U conditions. All drivers underwent a neurological, neuropsychological, and ophthalmological assessment and drove a Foerst FPF driving simulator. Conditions were: moderate traffic-no distraction (R1 & U1), high traffic-no distraction (R2 & U2), moderate traffic-conversation (R3 & U3), high traffic-conversation (R4 & U4). Continuous vehicle data obtained every 17 msec were recorded. The coefficient of variation (CV) was computed by dividing the intraindividual *SD* by the intraindividual *M* to provide a measure relative to the driver's level of performance for: speed; headway distance (from the vehicle ahead); lateral position (distance from the right road border).
Results: Repeated measures with condition as within-subject and group as between-subject variable in R conditions showed an effect of condition for headway and lateral position (ps < 0.001), with greater headway CV but smaller lateral position CV in R2 and R4. There was no effect of group for any measure but a condition by group interaction for headway ($p < 0.05$). In U conditions there was an effect of condition for headway ($p < 0.001$), with greater CV in U2 and U4; and an effect of group for lateral position (MCI drivers more variable than controls) and for headway (MCI & AD drivers less variable than controls) (ps < 0.01).
Conclusions: CVs are stable for the patient groups in R but less stable in U conditions. Greater headway variability (R & U) and smaller lateral position variability (R) were found in high traffic conditions.
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J. EPPIG, G.M. L. EGLIT, K.R. THOMAS, C.G. WONG, A.J. WEIGAND, E.C. EDMONDS, D.R. GALASKO, D. SALMON & M. BONDI. Empirical Classification of Cerebrospinal Fluid Alzheimer's Disease Biomarker Profiles in ADNI.

Objective: The A/T/N classification system identifies individuals as +/- on core Alzheimer's disease (AD) biomarkers, with 8 possible outcomes. The current study investigated an alternative approach using mixture modeling to classify ADNI participants into empirical AD biomarker profiles.

Participants and Methods: 1222 ADNI participants with Elecsys cerebrospinal fluid (CSF) data were included irrespective of diagnosis. Core AD CSF biomarker (A: $A\beta_{1\text{-}42}$, T: $pTau_{181}$, and N: total Tau [tTau]) levels and number of APOE ε4 alleles were used as continuous and categorical indicators in latent profile analysis (LPA). Local independence was relaxed to allow for $pTau_{181}$-tTau within-class correlation and prevent LPA over-extraction.

Results: Model fit indices and likelihood ratio testing indicated a 4-class solution as the optimal fit. Class 1 (n=351, 28.7%) had an AD-negative biomarker profile: high $A\beta_{1\text{-}42}$, low $pTau_{181}$ and tTau, and 17.6% ε4-positivity. Class 2 (n= 127, 10.5%) had an AD-positive biomarker profile: low $A\beta_{1\text{-}42}$, high $pTau_{181}$ and tTau, and 73.8% ε4-positivity. Class 3 (n=632, 51.4%) had a predominant Aβ/APOE ε4 biomarker profile: low $A\beta_{1\text{-}42}$, modest $pTau_{181}$ and tTau, and 62.9% ε4-positivity. Class 4 (n=112, 9.3%) had a mild Tau biomarker profile: very high $A\beta_{1\text{-}42}$, modest $pTau_{181}$ and tTau, and 15.3% ε4-positivity. Class 3 was older than all other classes (p's<0.02), and had a higher proportion of men than Class 2 and 4 (p's<0.013). The majority of individuals in Class 1 and 4 were cognitively normal (50.1%, 52.4%), with few dementia diagnoses (3.3%, 5.2%). Conversely, the majority of individuals in Class 2 and 3 had an ADNI MCI diagnosis (56.1%, 54.1%), or were diagnosed with dementia (38.4%, 27.4%).

Conclusions: Of 8 possible A/T/N categorizations, mixture modeling only identified 4 empirical AD biomarker profiles in ADNI. Future research should determine overlap of these LPA classes with A/T/N subtypes, as well as the longitudinal clinical outcome and cognitive trajectory of normal and MCI individuals in these classes.

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M.A. GLENN, J. SCOTT & R.S. WILSON. Delayed Primacy Retention-Weighted Retrieval in Cognitively Normal Older Adults with Alzheimer's Disease Pathology.

Objective: To determine whether reduced delayed primacy recall on the CERAD word list memory test (CWL) is predictive of postmortem Alzheimer's disease (AD) pathology in cognitively normal older adults. We hypothesized that lower delayed primacy retention-weighted scores would predict AD pathology.

Participants and Methods: The study sample included cognitively normal older adults (N=356) who participated in the Religious Orders Study or Memory and Aging Project at Rush Alzheimer's Disease Center. Archival data obtained included neuropathological measures of beta amyloid, neurofibrillary tangles, and global AD pathology quantified across 8 brain regions. CWL item-level performance closest in time to autopsy (0-2 years) was recoded to capture serial position information across 3 learning trials and the delayed recall trial. We tested our hypothesis with a novel primacy retention-weighted index that differentially weighted words recalled after a delay according to their order of presentation across 3 learning trials. Hierarchical multiple regression analyses were performed, with age, gender, and education in the first step, and cognitive variables added in the second step.

Results: Regressions revealed that delayed primacy retention-weighted retrieval contributed significantly to the model predicting global AD pathology [$F(1,348) = 6.04$, p=.01, R^2 change=.02; B=-.13] and medial temporal lobe tangles [$F(1,318) = 4.76$, p=.03, R^2 change=.01; B=-.12], with lower delayed primacy weighted scores predicting greater levels of pathology. The delayed primacy weighted score did not predict neocortical amyloid pathology (p>.05).

Conclusions: Assessment of delayed primacy weighted scores may be a sensitive marker of neurocognitive dysfunction associated with tangle pathology, even in those without AD. Future research could extend this work to test whether this measure improves detection of early cognitive decline associated with preclinical AD.

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H.L. GONZALEZ, X. CAO, C. KIM, D. SALMON & L. HILL. A 'Field' Test for Cognitive Impairment in Drivers with Suspected Dementia.

Objective: Encountering elderly drivers with suspected dementia during routine traffic stops is a growing concern for law enforcement officers. However, recognizing dementia can be difficult without some level of standardized objective assessment. The Driver Orientation Screen for Cognitive Impairment (DOSCI) was developed as a fast and concise method for law enforcement officers to screen for cognitively impaired drivers in the field. We sought to validate the DOSCI against standard clinic-based mental status tests and examine its sensitivity and specificity for detecting dementia.

Participants and Methods: The DOSCI, MMSE, Mattis DRS, and Blessed IMC test were administered to individuals with dementia (n=109) or Mild Cognitive Impairment (MCI; n=30) and normal controls (NC; n=79). The DOSCI is a 9-point scale (scored as errors) with questions concerning personal information (e.g., birth date, address) and time/place orientation that can be easily verified by law enforcement officers at a traffic stop.

Results: DOSCI scores were highly correlated with MMSE (r=-.747, p<.001), DRS (r=-.680, p<.001) and IMC (r=.844, p<.001) scores. Correlations remained strong when limited to the dementia sample: MMSE (r=-.652, p<.001), DRS (r=-.502, p<.001) and IMC (r=.789, p<.001). ROC analyses of DOSCI's ability to differentiate dementia from NC showed an area under the curve (AUC) of .846 (p<.001) with 52.8% sensitivity and 98.7% specificity (cut-off=2). ROC analysis comparing MCI and NC was not significant (AUC=.493).

Conclusions: The DOSCI is a valid instrument for screening for dementia in a standardized, objective manner that can be applied by law enforcement officers in the field. The DOSCI has excellent specificity (i.e., unimpaired drivers pass the test) and fair sensitivity (i.e., many, but not all, demented drivers fail the test) for detecting dementia, and does not detect those with only MCI (i.e., it avoids undesirable "false positive" results).

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K. GONZALEZ, K. KAUZOR, S. GIDANIAN, D. REATEGUI & J. RAZANI. Cognitive Functioning in Alzheimer's Patients and Caregiver Burden.

Objective: Although informal caregivers of patients with Alzheimer's Disease (AD) often display higher levels of perceived burden than the general population, the literature is inconclusive about the relationship between patient functioning and caregiver burden. This study aimed to determine how well different types of cognitive functioning predicts caregiver burden.

Participants and Methods: Forty-four Alzheimer's Disease (AD) patients and nineteen patients with Mild Cognitive Impairment (MCI) and their respective caregivers participated. The Direct Assessment of Functional Status (DAFS), and observation-based functional task was administered to AD patients, and for the purpose of this study, the transportation section was analyzed. The Rey-Osterrieth Complex Figure Test (Rey-O) was used to measure visual-spatial working memory; the Delis Kaplan Executive Function System Tower Test (D-KEFS) and

Wisconsin Card Sorting Test (WCST) Test measured executive functioning. Caregivers completed the Beck Depression Inventory (BDI), Brief Symptom Inventory (BSI), and Caregiver Burden Inventory (CBI).
Results: A stepwise regression was performed using the patients' neuropsychological and functional test performance for caregiver burden/distress. Findings revealed that the Rey-O, WCST, and DAFS transportation best predicted caregiver social and interpersonal burden. While, the D-KEFS Tower Test best predicted caregiver depression and anxiety.
Conclusions: These findings suggest that patient functioning on specific memory, cognitive reasoning, and daily activity tasks are better predictors of social and interpersonal burden, while executive functioning tests best predict psychological distress in caregivers. These findings can be effective for healthcare providers in providing support for informal caregivers of those with dementia.
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L.V. GRAVES, H.M. HOLDEN, E. VAN ETTEN, L. DELANO-WOOD, M. BONDI, D. SALMON, J. COREY-BLOOM, P. GILBERT & D. DELIS. New Intrusion Analyses on the CVLT-3: Clinical Utility in Distinguishing Patients with Alzheimer's and Huntington's Disease.
Objective: Research has shown that analyzing intrusion errors generated on verbal learning and memory measures is helpful for distinguishing between the memory disorders associated with Alzheimer's disease (AD) and other neurological conditions, including Huntington's disease (HD). Given recent evidence that certain clinical populations may be prone to exhibit different types of intrusion errors, we examined the prevalence of two new CVLT-3 intrusion subtypes – *across-trial novel* intrusions and *across/within trial repeated* intrusions – in patients with AD and HD. We hypothesized that the encoding/storage impairment associated with medial-temporal involvement in AD would result in a greater number of novel intrusions across recall trials, whereas the executive dysfunction associated with subcortical-frontal system involvement in HD would result in a greater number of repeated intrusions across trials.
Participants and Methods: Analysis of covariance tests with repeated measures (adjusting for age and gender) were conducted to examine the prevalence of *across-trial novel* and *across/within trial repeated* intrusions in well-characterized patients with AD (n=22) and HD (n=22).
Results: Results indicated that the AD group generated significantly more novel intrusions than the HD group, particularly on delayed cued-recall trials ($p<.05$, Cohen's $d=1.28$). Moreover, the AD group generated significantly more novel than repeated intrusions on delayed cued-recall trials ($p<.01$), and the HD group generated significantly more repeated than novel intrusions on delayed free-recall trials ($p<.05$).
Conclusions: Findings suggest that the nature of intrusion errors in AD may largely reflect an encoding/storage deficit associated with medial-temporal involvement, whereas intrusions in HD may reflect executive dysfunction (disinhibition, source memory problems) associated with subcortical-frontal system involvement. Findings thus provide information that may enhance the differential diagnosis of AD versus HD in both research and clinical settings.
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K. HACKETT, S. LEHMAN, R. DIVERS, K. CLARK, C. TAN & T. GIOVANNETTI. SmartPrompt Reminder Application Improves Completion of an Everyday Task.
Objective: Despite the plethora of electronic reminder applications, few have been developed to address the specific neuropsychological needs of people with dementia. We investigated the feasibility, efficacy, and usability of a phone-based reminder application, the SmartPrompt, whose design was informed by a neuropsychological model of functional disability.
Participants and Methods: Two participants (CJ: 82 y/o M, edu. 12, mild dementia; IW: 76 y/o F, edu. 16, mild cognitive impairment (MCI)) and their caregivers were included in this pilot study. Participants were instructed to obtain a glass of water (target task: hydration) four times during a 48-minute period in both a SmartPrompt (SP) and Unprompted condition (UP; order counterbalanced). In the SP, alarms signaled a series of reminders, instructions and built in support steps. In the UP, participants relied upon a cue card and digital clock to engage in self-driven monitoring. Participants were engaged in cognitive testing throughout to mimic everyday distraction. Outcome measures included percent of drinks obtained, frequency of checking behavior (i.e., interrupting cognitive testing to check the clock/cue card), and usability ratings. Caregivers were trained to configure the SP in a separate session and were then tested on the procedures.
Results: Both participants accomplished all four tasks in the SP (100%) as compared to 50%-75% accomplishment in the UP. Checking behavior decreased by 75%+ in the SP. Usability ratings were high (≧94/100) among both caregivers and the MCI participant (IW), while the dementia participant (CJ) gave a poor usability rating (50/100). Both caregivers obtained a perfect score on the configuration quiz and responded well to training.
Conclusions: Caregivers and participants were able to learn and effectively use a novel reminder application informed by a neuropsychological model. Mixed usability ratings among participants may reflect low computer self-efficacy and inexperience with technology and may be improved with additional training.
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N. HAWLEY & J. RAZANI. Examining the Rate of Decline in Activities of Daily Living in Alzheimer's Disease & Mild Cognitive Impairment.
Objective: Neurodegenerative disorders such as mild cognitive impairment (MCI) and Alzheimer's disease (AD), result in cognitive deficits and declines in the ability to carry out activities of daily living (ADL). Previous research has found detectable impairments of ADL in those who meet criteria for MCI (Schmitter-Edgecombe, Mcalister, Weakley & Rao, 2012) and in all stages of AD (Eisdorfer et al., 1992).
Participants and Methods: In the current study, 31 individuals identified as meeting MCI criteria and 27 individuals diagnosed with AD were administered the Direct Assessment of Functional Status (DAFS), at baseline and after a one-year follow-up period. Rate of decline was calculated as percentage lost between year-1 and year-2 performance. A multivariate analysis was conducted in order to examine whether performance on a functional measure, such as the DAFS, could potentially serve as a measure to classify a MCI or AD diagnoses and to distinguish between the two disorders.
Results: The results revealed that AD participants demonstrated a significant decline over the one-year period as compared to MCI participants who displayed decline or actual improvement in performance on the DAFS total score and shopping subsection. Additionally, the DAFS total score and shopping subsection were found to have the most overall accuracy rate in classifying MCI versus AD overall, relative to other subsections
Conclusions: The present study increases our understanding of patterns in ADL impairment displayed by individuals with neurocognitive disorders over a period of time. These findings may enhance diagnostic tools that may potentially identify and distinguish between MCI and AD with improved accuracy.
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T. HENDERSHOTT, S. ALLISON, A. FAGAN, T. BENZINGER, J. MORRIS & D. HEAD. Cognitive Mapping Ability as a Predictor of Conversion to Symptomatic Alzheimer Disease and Clinical Progression.

Objective: Preclinical Alzheimer disease (AD) has been associated with deficits in cognitive mapping cross-sectionally. However, there has been minimal longitudinal work. The primary goal of this study was to determine whether baseline cognitive mapping performance is associated with future conversion to symptomatic AD and/or clinical progression as measured by the Clinical Dementia Rating (CDR) scale. In addition, the relative predictive ability of cognitive mapping in comparison to previously reported predictors of conversion and decline, including AD biomarkers (cerebrospinal fluid (CSF) Aβ42 and tau) and regional brain volumes (hippocampal and parahippocampal), was examined.

Participants and Methods: Cognitive mapping was assessed in 93 participants (aged 50-90) with baseline CDR scores of 0-1 as well as existing AD biomarker and structural MRI data. Participants learned the spatial layout of a virtual environment over multiple learning trials (CM-Learning), and then retrieved landmark locations after a delay (CM-Test). Of 79 participants with CDR=0 at baseline, 7 participants converted to symptomatic AD (CDR>0) over an average 5.1-year period. Of the entire 93 participant cohort, 16 participants showed an increase in global CDR from baseline over an average 3.6-year period.

Results: There was a strong trend for CM-Learning to be associated with conversion to symptomatic AD (p=.054). CM-Learning (p<.001) and CM-Test (p=.003) scores were each a significant predictor of CDR progression. CM-Learning remained a unique predictor of clinical progression when AD biomarkers or regional brain volumes were added to the model (p=.012 and .010, respectively). CM-Test was also a unique predictor of progression with AD biomarkers or regional brain volumes in the model (p=.036 and .044, respectively).

Conclusions: Results suggest that performance on cognitive mapping tasks may be an appropriate tool to assess risk of cognitive decline.

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A.L. HOUCK, J. GUTIERREZ, F. GAO, K. IGWE, C. HALE, A. VINA ALBARRACIN, B.S. LAST, H. ANDREWS, L.S. HONIG, S.A. SMALL, S.E. BLACK & A.M. BRICKMAN. Cerebral Venopathy is Associated with White Matter Hyperintensities and Cerebrospinal Biomarkers for Alzheimer's Disease.

Objective: There has been an increased appreciation for the link between small vessel cerebrovascular disease, typically conceptualized as arterial and operationalized as white matter hyperintensities (WMH) on magnetic resonance imaging (MRI), and Alzheimer's disease (AD). Recent hypotheses suggest an additional role of venulopathy possibly related to collagenosis of the deep venules in the pathogenesis of WMH and Aβ clearance. The purpose of this study was to determine whether venopathy in large draining veins and WMH volume are related and to examine the association between venopathy and AD biomarkers in the cerebrospinal fluid (CSF).

Participants and Methods: We obtained high resolution MRI scans and CSF via lumbar puncture in 50 older adults without dementia (mean age: 69.3, 24 women). White matter hyperintensities were quantitated with in-house developed software applied to T2-weighted scans and the diameter of five regions of the cerebral venous draining system (superior sagittal sinus, great cerebral vein, internal cerebral veins, straight sinus origin, and straight sinus terminus) was measured to estimate degree of venous pathology, with higher values indicating greater degrees of venopathy. Amyloid and tau levels were measured on the Innogenetics Luminex bead-based multiplex (multi-analyte) platform.

Results: Adjusting for age, higher internal cerebral vein diameter was associated with larger WMH volume (Beta = 0.330, p<0.05). The straight sinus origin diameter was negatively associated with CSF $A\beta_{42}$ (Beta = -0.395, p<0.05).

Conclusions: Venopathy operationalized as increased diameter of specific regions of the cerebral venous draining system is associated with WMH and AD biomarkers, suggesting that pathology of the veins may play a pathogenic role in WMH pathogenesis and AD pathology clearance.

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P. JOSHI, M. HEYDARI, S. KANNAN, R. HONG, X. LIU, J. MASSARO, S. DEVINE, A. SANFORD H, T. ANG & R. AU. Temporal Associations of Neuropsychological Performance Using Unsupervised Learning Reveals a Distinct Signature of Alzheimer's Disease Status.

Objective: Neuropsychological (NP) tests measure cognition across numerous domains and evidence suggests that deficits across multiple domains can collectively inform declining cognitive status in Alzheimer's disease (AD). We evaluated the cumulative potential of NP tests at an earlier time point (TP1) to predict AD status measured 1-4years later (TP2), with the hope of identifying NP test-based signatures of preclinical AD.

Participants and Methods: Principles of unsupervised learning were leveraged to temporally analyze NP tests from Framingham Heart Study's (FHS) Offspring participants with clinically diagnosed normal/AD outcomes. Kullback-Leibler (KL) divergence was computed on each test independently and those with KL>0.5 were selected. Individuals with complete scores for Logical memory, Visual Reproductions, Paired Associate Learning, Boston naming and Trails B tests were included (n=149, ~age (TP1)=72.6+7.3, female=50.3%, AD(TP1)=40, AD(TP2)=54). Principal component (PC) analysis was performed on selected NP tests at TP1. For each point within the space defined by the first two PCs, nearest neighbors were computed based on Euclidean distance. All points excluding the test subject were labeled with the AD/normal status at TP2 and this label was used to predict the AD status of the test subject at TP2, followed by estimation of model performance.

Results: The model yielded 92.63% specificity, 74% sensitivity, 85.10% positive predictive value, 86.20% negative predictive value and 85% accuracy in identifying AD/normal cases.

Conclusions: These results highlight the capacity of unsupervised learning frameworks to detect early association with AD signatures and warrants further validation in the form of prospective studies.

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Aging

N.A. CORTINA, S. CHAPMAN, J.L. JOYCE, P. SUNDERARAMAN, E.D. HUEY, Y. STERN, B.R. IDNAY & S. COSENTINO. Face-Name Associative Memory is Sensitive to Family History of Neurologic Conditions Among Cognitively Normal Older Adults.

Objective: A number of challenging cognitive tasks have been developed in an attempt to capture subtle impairments which may reflect preclinical AD and which may not be detected with standardized neuropsychological tasks. This study examines the extent to which one such task, the *Face-Name Associative Memory Task*, is sensitive to family history of neurologic conditions among cognitively normal older adults, compared to a frequently used verbal list-learning test.

Participants and Methods: 45 cognitively healthy older adults (neuropsychological z-scores > -1.5 SD) 72.7 years old (SD = 7.19), 73.3% female, 84.4% Caucasian, and with 16.43 years of education (SD = 2.04) were enrolled in this study. All participants completed the Face-Name task and the Selective Reminding Test (SRT) as part of a larger

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battery, and were queried with regard to family history of various neurologic conditions. Degree of family history was measured as the number of parents affected (0, 1, 2). The Geriatric Depression Scale was used to assess any contribution of mood to the relationship between family history and cognitive performance. Partial correlations examined the relation of Face-Name to family history adjusting for age, education, and depression.

Results: Out of the 45 participants, 18 (19.6%) reported 0 parents affected, 23 (25 %) reported 1 parent affected and 6 (6.5%) reported 2 parents affected with at least one neurologic condition or cognitive/behavior changes. Stronger family history had an independent association with poorer performance on the Face-Name task (r=.31, p=.03), but not the SRT (r=.13, p=.43).

Conclusions: Performance on the Face-Name task is associated with family history of neurological conditions among healthy older adults. While this relationship could be mediated by mood, the current findings were independent of depressive symptoms. These results support the utility of targeted cognitive tasks to detect subtle cognitive weaknesses when individuals are otherwise deemed normal by standard neuropsychological testing.

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Dementia (Alzheimer's Disease)

J.L. JOYCE, S. CHAPMAN, L. YEUNG, P. SUNDERARAMAN, M. AZAR, Y. STERN & S. COSENTINO. Refining the Measurement of Subjective Cognitive Decline in Relation to Amyloid Deposition.

Objective: Subjective Cognitive Decline (SCD) has emerged as a potential pre-clinical marker of AD. Across previous studies, SCD has been inconsistently related to AD biomarkers. These inconclusive results may reflect variability in the way SCD is measured. In this study, we examined how different methods of measuring SCD affect the relationship with an AD biomarker, Aβ deposition, in the entorhinal cortex (EC). The EC is a crucial interface connecting the hippocampus and cortex, and is known to be one of the earliest regions affected by AD pathology.

Participants and Methods: The sample included 24 cognitively normal older adults (neuropsychological z-scores > -1.5; 54% male, 79% Caucasian) with a mean age of 66 (SD=5) and 16 (SD=2) years of education. Participants were assessed with three SCD frameworks: 1) in general; 2) as compared to 5 years ago (retrospective); and 3) as compared to others their age (age-anchored). Participants provided both dichotomous and ordinal responses. Aβ deposition was measured in the EC with F-florbetaben PET. Spearman correlations were performed to examine the relationship between the six SCD measurement conditions and Aβ deposition.

Results: Higher SCD, as measured dichotomously in the general framework, was associated with Aβ deposition in the right EC (r=.42, p=.04), but not the left (r=.38, p=. 07). The dichotomous retrospective framework was associated with Aβ deposition in both left (r=.42, p=.04) and right (r=.44, p=.03) EC.

Conclusions: Our results support that the measurement of SCD influences its association with AD biomarkers. Specifically, we found that answering questions about SCD in a yes/no format was more sensitive to EC Aβ deposition than ordinal responses. In contrast to previous results suggesting that age-anchored SCD may be most closely related to AD risk, these findings linked standard and retrospective SCD frameworks to an AD biomarker. These results emphasize the need to examine how the assessment of SCD changes its association with different AD biomarkers and outcomes.

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C. YOON, C. LEE, Z. TOMLJANOVIC, J.L. JOYCE, Q. RAZLIGHI, F. PROVENZANO, Y. STERN, S. CHAPMAN, W.C. KREISL & S. COSENTINO. Examination of Subjective Cognitive Decline (SCD) in relation to Hippocampal Atrophy.

Objective: Subjective Cognitive Decline (SCD) has gained increasing attention as a potential indicator of preclinical Alzheimer's disease (AD), largely due to evidence from a growing number of biomarker studies. Measuring SCD among "cognitively normal" adults may provide an accessible and non-invasive early diagnostic tool. However, additional work is needed to establish the precise manner in which SCD should be assessed to most reliably detect early disease. This study examines SCD measured in six different formats in relation to hippocampal volume (HV).

Participants and Methods: 21 older adults (9 female, 12 male), with an average age of 65.81 (SD=6.47) and 15.71 years of education (SD=2.87), underwent brain imaging and completed measures that assessed SCD and depression. HV was measured using T1-weighted MRI scans processed with FreeSurfer and manually corrected using guidelines provided by FreeSurfer. SCD was assessed both dichotomously and ordinally in three frameworks: 1) in general, 2) in comparison to 5 years ago (retrospective), and 3) in comparison to others of the same age (age-anchored). Pearson correlations were conducted to assess the relation between SCD and HV.

Results: Ordinally measured age-anchored SCD (SCD-A) was inversely related to HV bilaterally (LT: r= -.60, p=.004, RT: r= -.53, p=.01). No other SCD frameworks were associated with HV.

Conclusions: The precise manner in which SCD is assessed affects its association with disease biomarkers. SCD-A appeared to be most closely associated with HV, in contrast with other results from our lab indicating that dichotomously measured SCD in the general and retrospective frameworks maps onto amyloid deposition in the entorhinal cortex. It is thus important to carefully map out specific clinico-pathologic associations when determining the extent to which SCD can inform the detection of AD pathology pre-clinically.

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A. KISELICA & J. BENGE. Quantitative and Qualitative Features of Executive Dysfunction in Frontotemporal and Alzheimer's Dementia.

Objective: Alzheimer's Disease (AD) dementia is typified early on by deficits in memory, while Frontotemporal (FTD) dementia manifests executive dysfunction. Recent evidence suggests that executive dysfunction may occur earlier in AD than was previously appreciated. Thus, qualitative and quantitative characteristics of executive decline that differentiate FTD and AD, and when in the course of cognitive decline these distinctions occur, warrant further exploration. The goal of the current study is to examine differences in executive function in AD vs. FTD using recently developed normative data for trailmaking and phonemic fluency tasks.

Participants and Methods: We used data from 1626 individuals with AD and 744 individuals with FTD obtained from 36 Alzheimer's Disease Research Centers collected from 2005 to 2018. We compared overall performance and errors relative to demographically matched norms and after controlling for global cognitive decline.

Results: Errors were similar across dementia groups and elevated relative to derived normative values. Individuals with FTD exhibited poorer phonemic verbal fluency performance than those with AD, $F(1) = 55.45$, $p < .001$. However, individuals with AD appeared to perform more poorly on trailmaking tests overall, $F(1) = 14.29$, $p < .001$ and $F(1) = 8.27$, $p < .001$ for Trails A and Trails B, respectively. These differences were qualified by significant group x cognitive ability interactions, $F(1) = 23.87$, $p < .001$ and $F(1) = 19.41$, $p < .001$ for Trails A and Trails B, respectively. Individuals with FTD performed better than those with AD when overall cognitive ability was low; however, the pattern was reversed among those with high cognitive ability.

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Conclusions: Early in the neurodegenerative process, FTD is characterized by reduced executive functioning compared to AD on measures of phonemic fluency, processing speed, and set switching. However, this trend is reversed for processing speed and set switching as cognitive impairment increases.

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L. KORTHAUER, L. LAI, G. TREMONT, B.R. OTT, W.C. HEINDEL & E.K. FESTA. Amyloid Burden is Associated with Perceptual Binding Deficits in Semantic Memory.

Objective: Accessing semantic representations of objects (particularly living items) requires binding perceptual features stored across distributed neocortical areas. As Alzheimer's disease (AD) pathology disrupts neocortical connectivity, AD patients should have difficulty binding perceptual features of objects. We have previously reported that patients with mild cognitive impairment (MCI) and AD have a selective binding deficit for features of living, but not nonliving, objects (Korthauer et al., in prep). The present study extends these findings by investigating whether elevated genetic risk (APOE e4) and β-amyloid burden are associated with deficient sensory binding in preclinical AD and MCI.

Participants and Methods: Older adults (N = 27; *M* age = 71.1 yrs) underwent APOE genotyping, cognitive testing, and Florbetapir PET β-amyloid imaging. They were classified as cognitively normal (N = 15) or MCI (N = 12). Living and nonliving objects were presented in typical or atypical colors; participants made a rapid yes/no color typicality judgment for each object. Proportional change in response time (RT) for atypically versus typically colored objects was calculated; negative scores indicate greater sensory binding impairment.

Results: APOE e4 carriers and non-carriers did not differ in RT. After controlling for age and psychomotor speed, higher global SUVr was associated with greater slowing in response to atypically compared to typically colored living, but not nonliving, objects, r = -.45, p = .02. Region-of-interest analyses showed significant associations between sensory binding and SUVr in the anterior cingulate, posterior cingulate/precuneus, lateral temporal, and superior parietal cortices, p's < .05.

Conclusions: In older adults with preclinical AD and MCI, higher β-amyloid burden was associated with sensory binding deficits for living objects, consistent with presumed disruptions to neocortical connectivity. Sensory binding deficits may be a potential cognitive biomarker to discriminate healthy from pathological aging.

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M. LANG, M. ROSSELLI, M. GREIG-CUSTO, P. GARCIA, V.L. TORRES, I. VELEZ-URIBE, F. ARRUDA, D. LOEWENSTEIN, R. CURIEL, W. BARKER & R. DUARA. Greater Depressive Symptoms are Associated with Impaired Cognition, Independent of Ethnicity, in MCI and Dementia.

Objective: To analyze: (1) ethnic differences in the severity of depressive symptoms within groups of cognitively normal, Mild Cognitive Impairment (MCI) and dementia, and (2) the predictive value of depression to specific cognitive abilities by ethnic group across diagnoses, controlling for demographic variables.

Participants and Methods: We evaluated 173 Hispanic and White non-Hispanic (WNH) participants (110 females) from the 1Florida Alzheimer's Disease Research Center, who were diagnosed as Cognitively Normal (CN), MCI or Dementia. The mean age was 72.6 (*SD* = 8.1). The Geriatric Depression Score (GDS)-15 was used to determine depressive symptoms. Cognition was assessed using the LASSI-L (Loewenstein-Acevedo Scales of Semantic Interference and Learning; semantic memory), MINT (Multilingual Naming Test; confrontational naming) and Stroop interference (for executive function). A 3x2 Univariate ANOVA, linear regressions and a logistic regression were used to explore differences in depressive symptoms among diagnostic (Dx) and ethnic groups.

Results: Greater levels of depression were associated with lower cognitive function [$F(2, 164) = 3.4$, p = .03, η_p^2 = .04], after controlling for age, education, and MMSE total score, but there was no difference between the two ethnic groups. Pairwise comparisons demonstrated differences in depression scores between the CN and MCI group (p = .013) and between the normal and dementia group (p = .04), with the lowest levels of depression reported in the normal group. Depressive symptoms marginally predicted lower scores in semantic memory, β = -.27, p = .09, and confrontational naming, β = -.31, p = .07, for the MCI WNH group, with no significant results for the Stroop. Scores of ≤ 4 on the GDS predicted a diagnosis of CN rather than MCI or dementia.

Conclusions: Higher levels of depressive symptoms were associated with greater cognitive impairment, independent of ethnicity. Marginally significant results suggest effects of depression on cognition in the WNH MCI group.

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E. MAHON, Y. LIU, T. ANG, E.A. BOOTS, R. AU & M. LAMAR. Cognitive Properties Detected in Graphomotor Organization: Cross-Sectional Analyses from the Framingham Heart Study.

Objective: Organizing output during the Clock Drawing Test (CDT) by anchoring 12,6,3, and 9 before producing any other digits on the clock face has been associated with better executive function and learning/memory/recognition abilities. We investigated whether anchoring may serve as a preclinical symptom of dementia in an epidemiological study of aging.

Participants and Methods: Framingham Heart Study Offspring participants with CDT data (N=3,576; ~age=75.74±8.31, 53.48% women) also completed a neuropsychological evaluation of executive function, verbal and visual learning and memory, attention, and language. Multivariable linear regression models investigated the association of anchoring (present/absent) to cognitive test performance adjusting for age, sex, and education.

Results: Anchoring was present in 41.47% (n=1,483) of the sample. Compared to Non-Anchorers (n-2,093), Anchorers were older (p=.003), had higher levels of education (p<.0001), and were more likely to be women (p=.0002). Despite taking longer to complete command (estimate= -4.18, SE=0.60, p<.0001) and copy (estimate= -2.32, SE= 0.38, p<.0001) CDT conditions, individual regression models revealed that Anchorers performed better than Non-Anchorers on tests of executive function (Trail Making B, estimate= 0.029, SE= 0.005, p<.0001; Similarities, estimate= -0.65, SE= 0.10, p<.0001), learning (Logical Memory Immediate, estimate= -0.49, SE= 0.11, p<.0001), and language (Boston Naming Test, estimate= -0.01, SE= 0.01, p<.0001). Groups did not differ on verbal memory/recognition, visual learning/memory/recognition, or attention.

Conclusions: Results confirm previous reports of Anchoring being associated with better performance for executive function and verbal learning but not for verbal memory/recognition, and extended findings to include language. Anchoring may provide clinical utility in identifying persons at risk for cognitive decline, potentially leading to earlier interventions that could decrease risk of dementia.

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E.F. MATUSZ, S.A. SPERLING & B. MARCOPULOS. Screening for Dementia: An Examination of Subscale Relative Importance.

Objective: Heightened awareness of dementia has resulted in a push to further improve upon cognitive screening measures. Specifically, many researchers have attempted to increase the sensitivity of these tests in order to decrease Type II error rate, and therefore increase the number of cases identified with signs of abnormal cognitive deficit. Although

previous assessment research suggests that scaling and weighting procedures influence measurement sensitivity and specificity rates, the examination of this remains somewhat limited among neuropsychological literature. To address these issues, the current study examined whether a statistically weighted scoring algorithm for the Mattis Dementia Rating Scale 2 (DRS-2) would increase DRS-2 sensitivity.
Participants and Methods: This study utilized archival data from a clinical cohort of 113 older adults diagnosed with Alzheimer's disease dementia (AD) and Mild Cognitive Impairment (MCI), ages 65 and older (55 AD, 58 MCI). The new scoring DRS-2 algorithm was constructed utilizing standardized beta weights obtained from logistic regression analysis. The predictive validity of the DRS-2 cut score was analyzed utilizing the logit-weighted scoring algorithm and subsequent comparisons were made between the original and logit-weighted DRS-2 scores.
Results: The logit-weighted DRS-2 scores maintained 90.90% sensitivity and 74.14% specificity. This represented a 12.72% increase in sensitivity and a 12.07% decrease in specificity compared to the rates associated with the original scoring method.
Conclusions: Results revealed that the application of statistically derived weights increased the sensitivity of the DRS-2. This study highlights the importance of weighting, as the use of statistically derived weights may serve as an alternative way to improve the sensitivity of brief screening tests. Additional research is needed to investigate this effect utilizing a normative comparison group and to examine this effect across different clinical populations.
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K.D. MUELLER, R. KOSCIK, E. JONAITIS, E.C. DUNN, E.E. HACKETT, S. LINSENMEYER, T.J. BETTHAUSER, B. CHRISTIAN, B.P. HERMANN & S. JOHNSON. Beta-amyloid status is associated with longitudinal connected speech and language in cognitively unimpaired adults.
Objective: While there is evidence that discourse changes occur in Alzheimer's disease (AD) dementia, less is known regarding discourse changes in preclinical AD. Our aim was to determine if beta-amyloid (Aβ) status associated with changes in longitudinal discourse patterns elicited from a picture description task from cognitively unimpaired (CU) adults.
Participants and Methods: We used 178 CU participants from the Wisconsin Registry for Alzheimer's Prevention (WRAP) with 1-3 time points of connected speech-language (CSL) and [^{11}C]Pittsburgh Compound B (PiB) imaging. CSL measures were extracted from automated language analyses; we determined Aβ+ using a published cutoff of >=1.19 from global PiB-DVR. LME models included CSL outcomes to examine whether age-related trajectories differed by Aβ status, including random intercepts per participant and covarying sex and WRAT-3 reading.
Results: Participants had mean(sd) age of 64(6) at 1st speech sample, 17(3) years of education, 121(68%) female, and 25(14%) Aβ+. Cognitive scores at 1st speech include MMSE(29,.9), AVLT Total(50,9), and BNT(58,3). Significant interactions between Aβ and age estimated that mean length of utterance (MLU) was 0.85 lower with each year older in the Aβ+ group vs 0.11 higher in the Aβ- group (p<.001); similar results were seen for usage of unique words (p=.02) and total words (p=.003). Main effects showed that Aβ+ was associated with higher MLU (p<.001) and total words (p<.001) and lower open/closed class ratio (p=.03).
Conclusions: In this younger and CU group, several discourse measures worsened more rapidly in the Aβ+ vs Ab- group. Aβ+ participants tended to use more total words, yet smaller open-to-closed class ratios regardless of age, indicating higher use of nonspecific language, consistent with previous literature in MCI and AD. The speech samples were quick (~1 min) and inexpensive to administer. If findings replicate in larger samples, CSL may be a practical and sensitive tool to add in clinical and research settings investigating preclinical AD.
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M. NISHIKAWA, J.J. MANLY, N. SCHUPF, R. MAYEUX & Y. GU. Dietary Prebiotic Consumption is Associated with Reduced Risk of Alzheimer's Disease in an Elderly Population.
Objective: To investigate the association between dietary prebiotic intake and risk for Alzheimer's Disease (AD). Prebiotics are nondigestible chemical substances that stimulate growth and/or activity of pathogen-inhibiting gut microbiota.
Participants and Methods: This longitudinal study includes 2,411 elderly (≥65 years) participants of a multi-ethnic community-based cohort study who had provided dietary information from food frequency questionnaires. Total daily intake of fructan, one of the best known prebiotics, was calculated based on consumption frequency and fructan content per serving of 8 food items, including bananas, white bread, dark bread, potato chips or corn chips, peas or lima beans, beans or lentils, rice or pasta, and cold breakfast cereal. The consensus diagnosis of AD was based on all available clinical, neurological, and neuropsychological information collected approximately every 1.5 years. The associations of daily fructan intake with AD risk were examined using a cox proportional hazards model, adjusted for cohort recruitment wave, age, sex, race/ethnicity, education, apolipoprotein E genotype, and daily caloric intake.
Results: There were 509 incident AD causes during a follow-up of 7.5 years. Each additional gram of fructan intake was associated with lower risk for AD: hazard ratio (HR), 0.79; 95% confidence interval (95%CI)= 0.65-0.97; p = 0.021. Compared with subjects in the lowest tertile of daily fructan intake, the HR (95% CI) for subjects in the middle and highest tertile were 1.01 (0.81-1.27) and 0.77 (0.61-0.97), respectively (p for trend = 0.019). Stratified analyses by race/ethnic groups showed that fructan intake was significantly associated with reduced AD risk only in Hispanics, but not in non-Hispanic Blacks or Whites. Additionally adjusting for smoking, alcohol consumption, and comorbidity index did not change results materially.
Conclusions: Higher fructan intake is associated with reduced risk of AD among elderly subjects.
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A.N. PARKER, J. SCHAFFERT, S. BURMASTER & C. CULLUM. Predementia Hypertension and Antihypertensive Treatment is Associated with Age of Dementia Onset.
Objective: Studies examining the link between hypertension and dementia have yielded mixed results. However, evidence suggests that antihypertensive treatment may attenuate the link between hypertension and dementia. Our aim was to see whether hypertension and antihypertensive treatment at baseline were associated with age of onset.
Participants and Methods: 372 participants without a history of stroke who were classified as non-demented at baseline but later diagnosed with dementia were obtained from the National Alzheimer's Coordinating Center. Blood pressure was measured at first visit, and participants were categorized into non-hypertensive, prehypertensive, or hypertensive based on CDC criteria, and treatment groups, defined as self-reported use of any antihypertensive agent at the first visit. Chi-square and t-tests were used to evaluate if groups differed in demographics or APOE ε4 status. 3x2 ANOVAs were used to assess if hypertension status and/or treatment status was associated with age of dementia onset.
Results: Those receiving treatment had a 2-year later age of onset than those who were not receiving treatment (M=84.5 vs 82.0, F=7.01 p=.008). Interestingly, those with hypertension had a significantly later age of onset (M=85.5) than those with prehypertension (M=82.6) or normal blood pressure (M=81.6, F=9.74 p<.001). Treatment status did not interact with hypertension group to affect age of onset (p=.97).

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Conclusions: Predementia hypertension and antihypertensive treatment were associated with an overall later age of dementia onset. This suggests that antihypertensive agents may play a role in delaying age of onset in some individuals. Further research should explore potential factors such as medical/treatment history or use of specific medications.
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J.Q. PHAM, K.B. CASALETTO, R. LA JOIE, A.M. STAFFARONI & G. RABINOVICI. Baseline Neuropsychiatric Symptoms as a Predictor of Cognitive Progression in Alzheimer's Disease.
Objective: Psychiatric and neurologic symptoms frequently co-occur in Alzheimer's disease (AD) and disentangling the comorbidity may further our understanding of disease trajectories. Previous studies have demonstrated that neuropsychiatric distress heightens the risk for conversion from mild cognitive impairment (MCI) to dementia. We aimed to better characterize the predictive utility of baseline patient and caregiver-endorsed psychiatric symptoms on cognitive decline within a biomarker confirmed AD cohort.
Participants and Methods: We included 60 amyloid PET-positive participants with diverse AD clinical phenotypes (43 amnestic/non-amnestic, 8 logopenic primary progressive aphasia, 9 posterior cortical atrophy; mean age= 63.5 years, education= 17.3 years) who completed the Geriatric Depression Scale (GDS). Clinical Dementia Rating Scale (CDR) and Neuropsychiatric inventory (NPI) were acquired via informant interviews. Cognitive assessments were collected longitudinally using a combination of standardized neuropsychological measures (87 time points; mean follow up = 2 years). Mixed-effects regression models examined the impact of baseline GDS and NPI as predictors of progression in global cognition (MMSE), memory, executive, visuospatial, semantic, and processing speed composites.
Results: Adjusting for age, sex, education, and functional severity (CDR), higher baseline GDS scores were associated with steeper rates of memory decline (b=-0.02, p = 0.015) but not with other cognitive domains (ps>0.05). Additionally, baseline caregiver-based NPI scores were not significantly associated with declines on any neuropsychological domains (ps>0.05).
Conclusions: Our findings support the predictive importance of patient-reported depression for rates of memory decline in individuals with AD. This suggests that baseline GDS scores could be capturing changes associated with limbic areas, prominent in memory and emotion processes, and future cognitive performance.
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C. PUZO, C. LABRIOLA, M. SUGARMAN, Y. TRIPODIS, B. MARTIN, J.N. PALMISANO, E.G. STEINBERG, N.W. KOWALL, J. MEZ, R. KILLIANY, R. STERN & M.L. ALOSCO. The Unique Effects of White Matter Hyperintensities on Cognitive Decline in Alzheimer's Disease: A Longitudinal Investigation Among 465 Participants from the National Alzheimer's Coordinating Center.
Objective: Research shows white matter hyperintensities (WMH), an MRI marker of cerebral small vessel disease (CSVD), are an early feature of Alzheimer's disease (AD) that impacts its course and progression. The unique effects of WMH on the clinical expression of AD are unclear due to limited and inconsistent longitudinal evidence. We used the National Alzheimer's Coordinating Center (NACC) Uniform Data Set (UDS) to examine WMH as a predictor of cognitive decline and diagnostic conversion independent of traditional AD biomarkers.
Participants and Methods: The sample included 465 participants from the NACC-UDS with baseline normal cognition (NC) who had quantitated WMH from FLAIR MRI. Participants were administered a neuropsychological battery and had >2 follow-up visits. 101 participants had baseline CSF Abmeasurements. For individuals who converted to MCI (n=22) or dementia (n=26), only those with AD as a suspected etiology were included. Generalized estimating equations tested baseline WMH (log-transformed) as a predictor of cognitive decline, adjusting for age, sex, APOE e4, race, education, hippocampal volume, and total brain volume.
Results: WMH did not predict conversion from NC to MCI or NC to AD dementia (ps>0.10). However, higher WMH volume predicted more rapid decline on semantic fluency (p<0.01), digit symbol coding (p<0.01), Trails A (p=0.05), and Trails B (p=0.02). In the participants with CSF, the effects of WMH on cognitive decline were of a similar magnitude and independent from Ab.
Conclusions: In this sample of mostly cognitively normal participants, increased WMH volume predicted accelerated decline in executive function, working memory and processing speed, and semantic fluency independent of standard AD MRI and CSF biomarkers. WMH did not predict diagnostic conversion likely due to the limited follow-up. CSVD may contribute to early frontal systems decline prior to frank AD neurodegeneration and could underpin atypical presentations of AD.
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C.S. PUZZANGHERO, J. VONK, E. DALCHAND, N. SCHUPF, R. MAYEUX & J.J. MANLY. Sibship Size Predicts Elevated Dementia Risk in Blacks and Hispanics, but not Whites.
Objective: Sibship size is related to lower cognitive ability. The mechanism for this relationship is thought to be childhood socioeconomic status, since family resources are finite and must be shared among all siblings. We investigated the relationship of sibship size to incident dementia.
Participants and Methods: Participants were 5,017 adults who were dementia-free at baseline, and aged 65+ (67.4% women) from a community-based longitudinal study of memory and aging. There were 678 incident cases of dementia. Sibship size was categorized into 6 groups: no siblings (*N* = 808), 1 (*N* = 929), 2 (*N* = 697), 3-4 (N = 1019) 4-5 (N = 688), and 6 to 17 (N = 876) Cox regression models tested the effects of sibship size on risk of developing dementia, using years to event since baseline as the time scale, and adjusting for confounding variables.
Results: On average, Hispanics (*N* = 2185) had more siblings than non-Hispanic Blacks (*N* = 1505), who had more siblings that non-Hispanic Whites (*N* = 1250). The relationship of sibship size to risk of dementia depended on race/ethnicity. There was no relationship among Whites in an unadjusted model or after adjusting for age at baseline, sex/gender, and recruitment cohort. Compared to Blacks with no siblings, risk of dementia was elevated in all groups with more than one sibling; Blacks with 5 or more siblings were 2.2 (95% CI = 1.3 – 3.8) times more likely to develop dementia. Risk of incident dementia was 50% more likely among Hispanics with 5 or more siblings as compared to those with none. There were no sex/gender interactions with sibship size on dementia risk.
Conclusions: We used sibship size as a marker for childhood socioeconomic status and found that among Blacks and Hispanics, larger sibship size was associated with higher risk for dementia. There was no association in Whites, even those with large families, suggesting that Whites may have access to other resources to offset dilution of resources in large sibships.
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W. QI, B. GRADWOHL, S.S. AMANO, A.A. TURK NOLTY & M. HARRINGTON. Learning, Memory and Hippocampal Volume in a Sample of Cognitively Healthy Older Adults with and without Pre-Symptomatic Alzheimer's Disease.
Objective: Alzheimer's disease (AD) is a pervasive neurodegenerative disease that can be difficult to diagnose accurately in the pre-symptomatic stages. Pathological cerebrospinal fluid (beta-amyloid and tau)

and hippocampal volume loss are regarded as early indicators of the disease. Both can be identified before the cognitive deficits (e.g., learning and memory) become apparent. The purpose of the present study is to investigate potential differences in learning, memory, and hippocampal volume in a pre-symptomatic, cognitively healthy AD population, differentiated by their beta-amyloid and tau biochemistry.
Participants and Methods: Thirty-eight older adults completed cerebrospinal fluid (CSF), the California Verbal Learning Test-2nd Edition (CVLT-II), and magnetic resonance imaging (MRI). They were classified into two groups according to a cut-off score of beta-amyloid to tau ratio (2.71): normal (CH-NAT; n = 21) and pathological (CH-PAT; n = 17). Their age, gender, ethnicity make-up and various domains of intellectual functioning were comparable (ps ranged from .42 to .97).
Results: ANCOVA results indicated that the two groups did not differ significantly in their total white matter, total grey matter, or total, left and right hippocampus volumes (ps ranged from .57 to .98). However, surprisingly, the CH-PAT group scored significantly better on the CVLT-II List B task than the CH-NAT group ($p < .05$, $\eta p2 = .12$); similarly, there was a marginal difference in CVLT-II List 1 scores, with the CH-PAT groups tending to score higher ($p = .09$).
Conclusions: The lack of difference in brain volumes and most aspects of verbal memory between the two groups suggest that these changes may develop later than and, potentially, secondary to, the neurobiological changes in pre-symptomatic AD patients. Further exploration and replication are also needed to elucidate why the CH-PAT group performed better than the CH-NAT group in some aspects of memory functioning.
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M. QUINTANA, R. GARCÍA-BETANCES, K. LIKHMANOVA, J. FRÖGREN, P. ANDERBERG, J. BERGLUND, N. CANO & M. GAROLERA. SMART4MD Project: preliminary results of satisfaction and interaction data on the use of the application.
Objective: The SMART4MD project developed an m-Health patient support tool specifically targeted and adapted to people with mild dementia. Our aim is to study in a preliminary way satisfaction and interaction on the use of the SMART4MD application.
Participants and Methods: A total of 25 dyads (People living with dementia, PWD and caregiver) were included: 20 in the satisfaction study of the Blekinge Institute of Technology, BTH (Sweden) and Consorci Sanitari de Terrassa, CST (Spain) and 5 in the interaction study of the CST. The satisfaction evaluation was conducted through a structured interview with the PWD and Carer separately. The interview consisted of an evaluation specifically tailored to the study. It was based on quality attributes most significant for the general user satisfaction among users of similar health information technology (accessibility, safety & trustability, understandability; empowerment) and on principles that provide the foundation for Web accessibility according to WCAG 2.0. The satisfaction evaluation was analysed in the following way: If a respondent had a total score of 15 or more (range 0-20), he or she was considered to be satisfied with using the application. The interaction on the use of the SMART4MD was studied from the logs obtained from the application itself, counting the number of times they enter each section.
Results: Regarding satisfaction, 81% received a score of 15 or higher. Average value was 19. Regarding the interaction with the app, the most used sections were: my reminders (25%), games and resources (24%), customize the app (17%), my health (15%) and people I know (11%).
Conclusions: SMART4MD application is a suitable tool for both people with dementia and caregiver. A satisfaction evaluation, based on a structured interview was made and the goal of 75% satisfaction rate (15 of 20 dyads) was reached. The interaction data helps us to know those functionalities that arouse more interest in our participants.
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K. SOL, N. SHARIFIAN, J.J. MANLY, N. SCHUPF, R. MAYEUX, A.M. BRICKMAN & L.B. ZAHODNE. Loneliness Moderates the Relationship Between Reading Ability and Cognition in African American and White Older Adults.
Objective: Growing evidence suggests a negative impact of perceived loneliness on late-life health independent of other aspects of social relations. Fewer studies have examined how loneliness interacts with cognitive reserve or operates differently in African-American (AA) older adults, who have higher incidence of dementia than Whites. Reading ability may be a better proxy for cognitive reserve than years of education in AA older adults due to racial differences in educational quality.
Participants and Methods: Participants in this cross-sectional study were drawn from the Washington Heights-Inwood Columbia Aging Project. Linear regressions estimated main effects and interactions of reading (Wide Range Achievement Test), loneliness (NIH Toolbox), and race (AA vs non-Hispanic White) in 423 older adults ($M_{age} = 74$; 58% AA). Cognitive outcomes included composite scores of memory, language, speed, and visuospatial functioning. Analyses controlled for age, sex/gender, race, education, income, employment status, depressive symptoms, disease burden, marital status, social network size, and participation in social groups.
Results: Loneliness was significantly associated with reading ($r = .10$), participation in social groups ($r = -.12$), social network size ($r = -.26$), and depressive symptoms ($r = .31$). There were no three-way interactions between loneliness, reading, and race. A significant loneliness by reading interaction indicated a weaker positive association between reading and episodic memory among individuals with greater loneliness (β=.24 vs .28).
Conclusions: While cross-sectional, these results suggest that loneliness may suppress the protective effect of higher reading ability on cognitive health among older AA and White adults. Findings also confirm previous work indicating that the perception of loneliness is relevant to older adults' health, independent of other social variables. Future work may explore whether interventions to alleviate feelings of loneliness could reduce cognitive decline in older adults.
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J.G. SPRINGER, C. PIERPAOLI PARKER, J. MCMINN & K. LOKKEN. Hyperhomocysteinemia and Cognitive Functioning.
Objective: Elevated homocysteine (tHcy), an excitatory amino acid, is associated with lower global cognition in nondemented older adults, those with mild cognitive impairment (MCI), and Alzheimer's Disease (AD) patients. Higher baseline tHcy is also associated with increased risk of progression of MCI to dementia. The connection between tHcy and AD has several proposed mechanisms of action, as tHcy is implicated in endothelial dysfunction, promotion of amyloidosis, elevation of tau phosphorylation, and changes in hippocampal signaling and synaptic plasticity. The objective of this study was to further examine the association between tHcy and cognition using a battery of tests sensitive to impairment in multiple cognitive domains.
Participants and Methods: 40 participants (M=69.73; SD=9.03) seeking prevention or treatment of cognitive issues through a private brain health clinic received: 1) full neuropsychological testing; 2) comprehensive blood work; and 3) psychomedical assessment.
Results: Baseline tHcy was significantly inversely correlated with a global measure of cognition (WMS-IV BCSE), in addition to tests sensitive to memory (Rey Long Delay Free Recall [DFR]; CVLT-II Trial 5, CVLT-II Short DFR, and CVLT-II LDFR), verbal fluency (FAS; Animal Fluency), processing speed (Trails A), and executive functions (Trails B; WCST).

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Conclusions: Results provide support that high tHcy is associated with lower performance in multiple cognitive domains. The addition of targeted blood work to full neurobehavioral assessments may show promise in further honing skilled early identification and differential diagnosis of those with cognitive complaints. Preliminary data highlight the potential role of tHcy in the management and treatment of cognitive dysfunction, given the prevalence of hyperhomocysteinemia in the population and known methods for targeted treatment. Future intervention studies are warranted to further clarify this association.

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J. SZAJER, C.G. WONG, K.R. THOMAS, D.J. LIBON, S. DEVINE, R. AU, C. MURPHY & M. BONDI. Neuropsychological Process Score Profiles in Middle-aged and Older Minorities.

Objective: Subtle cognitive deficits, such as those measured using neuropsychological process scores, may occur as early as middle age and may be predictive of mild cognitive impairment (MCI) and conversion to Alzheimer's disease (AD) and other dementias. Certain ethnic/racial minorities have increased risk for MCI, AD and other dementias, and ethnic/racial variance has been demonstrated in standard neuropsychological total test scores. However, there is little research on the effects of ethnicity/race on process score performance, with the few existing studies focused primarily on executive functions. We examined the effects of ethnicity/race on process scores in middle and old age.

Participants and Methods: Participants (ages 40-85) included cognitively normal Hispanics ($N = 156$), African Americans ($N = 154$) and Asians ($N = 124$) from the Framingham Heart Study OMNI cohorts. Total and process scores were derived from the Wechsler Memory Scales (WMS) Logical Memory, Visual Reproduction, and Verbal Paired Associates tests. Process scores included: intrusions and confabulations, perseverations and repetitions, and total errors across tests. Analyses controlled for educational achievement and sex.

Results: Age significantly predicted total score performance and process score errors across memory measures ($p < .01$). Main effects of ethnicity/race were found for total scores ($p < .01$), with Asian Americans outperforming African Americans and Hispanics on most measures. Hispanics generated significantly more intrusion errors ($p < .05$). Asians tended to generate fewer overall errors than Hispanics and African Americans, although some effects were moderated by education.

Conclusions: Findings highlight the importance of accounting for ethnicity/race in the evaluation of process score performance, which can aid efforts aimed at detecting early subtle changes indicating risk for AD and dementia in minority and diverse groups. Future studies of sociodemographic and health-related mediators of subtle cognitive deficits are warranted.

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V.L. TORRES, M. ROSSELLI, A. BAENA, E. GUZMAN-VELEZ, D. AGUIRRE-ACEVEDO, V. TIRADO, Y. BOCANEGRA, C. MUNOZ, E. HENAO, S. MORENO, D. ALZATE, P. LOPERA, L. VELILLA, Y. ZULUAGA, Y. QUIROZ & F. LOPERA. Normative Data Stratified by age and Education for Cognitive Measures used in the Grupo de Neurociencias de Antioquia, Colombia.

Objective: Ongoing efforts by the Grupo de Neurociencias de Antioquia (GNA) in Colombia and the Alzheimer's Prevention Initiative (API) Registry have characterized over 5,800 individuals from families at risk for autosomal-dominant Alzheimer's disease (ADAD) with clinical and cognitive assessments since the 1990s. Approximately 75% of these individuals are cognitively unimpaired and are not genetically predisposed to develop ADAD. We aimed to expand existing normative data for the Consortium to Establish a Registry for Alzheimer's Disease-Colombia (CERAD-Col) and to develop norms for additional tests used at GNA, but which lack normative data.

Participants and Methods: Participants belong to families enrolled in the Colombia API Registry organized by the GNA in Colombia and followed for nearly 30 years. Baseline neuropsychological evaluations of 2,673 cognitively unimpaired non-carriers (56% females) were included, with ages ranging from 18 to 86 years ($M = 32.94$, $SD = 12.10$), and years of education ranging from 1 to 25 years ($M = 8.89$, $SD = 4.34$). We divided participants into ten subgroups based on the following ages: 18-22, 23-27, 28-32, 33-37, 38-42, 43-47, 48-52, 53-57, 58-64, and 65 and over) and years of education based on level of scholarship (i.e., elementary, high school, or college) corresponding to 1-5, 6-11, or 12 or more years of education.

Results: Cronbach's alpha coefficients were obtained for each test. Normative data for seven cognitive domains: language, attention, verbal learning memory, verbal recall memory, visuospatial abilities, visual memory, and executive function are presented, including descriptive statistics and standard scores according to age and level of education. In addition, separate normative scores for males and females are disclosed for the seven subtests in which gender differences were observed.

Conclusions: We provided population-based normative data for Colombia, which can be useful for the neuropsychological assessment of Spanish speakers from Latin America.

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C. VILA-CASTELAR, A. ARTOLA, A. SCHULTZ, A. BAENA, J. GATCHEL, E. GUZMAN-VELEZ, E. PARDILLA-DELGADO, J.T. FULLER, Y. BOCANEGRA, R. SPERLING, K. JOHNSON, F. LOPERA & Y. QUIROZ. Sex Differences in Cognitive and Neuroimaging Markers in Non-Demented Individuals at Risk for Autosomal Dominant Alzheimer's Disease.

Objective: Women have higher incidence of Alzheimer's Disease (AD) and faster rate of cognitive decline, although sex-specific underlying mechanisms remain poorly understood. To elucidate the interaction between sex and pathophysiological changes in preclinical AD, we assessed the largest kindred at risk to develop autosomal dominant AD due to a single Presenilin (PSEN)-1 E280A mutation. We aimed to 1) characterize the role of sex in cognitive performance, amyloid burden, and tau accumulation in carriers, and 2) investigate whether male and female carriers exhibit differential associations between age, cognition and markers of pathology.

Participants and Methods: We conducted a cross-sectional study assessing 17 cognitively normal individuals with a *PSEN1* E280A mutation from a large extended family in Antioquia, Colombia (Females=10). Outcome measures: a) Cognitive: Mini-Mental State Examination and *CERAD* Word List delayed recall; b) Neuroimaging: Positron emission tomography brain amyloid load composite, and regional tau accumulation (hippocampi, entorhinal cortex, parahippocampal gyrus, inferior temporal cortex). Mann-Whitney and Spearman Correlation tests were conducted.

Results: Cognitive and pathology markers did not differ between male and female carriers. No sex differences were found in the correlation between cognitive performance and markers of pathology, while age was correlated with cortical amyloid burden (p=.01), and tau accumulation in the entorhinal (p=.02) and inferior temporal cortex (p=.04) in female carriers only.

Conclusions: Preliminary findings suggest that females and males destined to develop Autosomal Dominant AD due to a *PSEN1* E280A mutation do not differ in memory performance, or levels of amyloid deposition and tau degeneration. In contrast, older age was associated with worse levels of pathology (amyloid and tau accumulation) in female carriers only. Further research is needed to elucidate how sex differences influence AD pathophysiological cascade changes, from preclinical to clinical stages.

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A.J. WEIGAND, K.J. BANGEN, K.R. THOMAS, D. SALMON, D.R. GALASKO & M. BONDI. Medial Temporal Lobe Tau in the Absence of Amyloid may Indicate an Early Stage of Alzheimer's Disease Rather than an Age-Related Phenomenon.

Objective: The amyloid cascade model and NIA-AA biomarker-only framework for Alzheimer's disease (AD) posit that amyloid emerges prior to tau neurofibrillary tangle (NFT) pathology. Medial temporal lobe (MTL) NFTs, however, are frequently seen at autopsy in the absence of amyloid, a phenomenon that may reflect a consequence of normal aging (i.e., primary age-related tauopathy, or 'PART') or instead may indicate an early stage of AD pathology. We examined the prevalence of abnormal brain amyloid and tau biomarkers and associations with cognition to better understand the temporal sequence of pathologic events in AD.

Participants and Methods: 152 Alzheimer's Disease Neuroimaging Initiative participants without dementia had AV1451 (tau) and AV45 (amyloid) positron emission tomography (PET). Four groups were examined based on cortical amyloid (SUVR ≥ 1.11) and MTL tau PET (Braak stage I-IV) positivity: A-/T-, A+/T-, A-/T+, or A+/T+. Group differences in cognitive performance were assessed using ANCOVAs adjusting for age, sex, education, and APOE ε4 status.

Results: The largest group was A-/T+ (45% of the sample) followed by A+/T+ (42%) and A-/T- (10%). Because only 3% of the sample were identified as A+/T-, this group was excluded from cognitive comparisons. In the A-/T+ group, all had Braak I/II positivity and 28% had reached Braak III/IV positivity. The A-/T+ group performed significantly worse than the A-/T- group on Trails B and Logical Memory I, and the A-/T+ group did not differ from the A+/T+ group on any cognitive measure. Qualitatively, there was a pattern of step-wise decrease in cognitive performance (A-/T- > A-/T+ > A+/T+).

Conclusions: Results revealed that only 3% of the sample had PET evidence of cortical amyloid in the absence of tau pathology. Further, cognitive performance in the A-/T+ group was generally poorer than in individuals without either pathology. These findings challenge prevailing models of AD that posit amyloid precede tau and suggest that MTL NFTs alone may be pathological rather than age-related.

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B. YEW & D.A. NATION. Higher Inferior Temporal Cerebrovascular Resistance is Associated with Greater Alzheimer's Disease Biomarker Positivity and Worse Cognitive Performance.

Objective: Increased cerebrovascular resistance (CVR) has been implicated in pathological aging and cognitive decline. Relationships between CVR and Alzheimer's disease (AD) biomarkers, however, remain largely unexplored.

Participants and Methods: Community-dwelling older adults (N = 152) from the ADNI study underwent arterial spin labelling MRI to measure CBF in neural regions typically affected by AD. Mean arterial pressure was calculated from brachial artery blood pressure, and divided by regional CBF to index regional CVR. CSF amyloid and p-tau were measured at baseline and 4 years from CSF samples obtained via lumbar puncture. Participants also completed cognitive testing. Relationships between regional CVR index and longitudinal biomarker positivity were evaluated, adjusting for neuronal metabolism as determined by FDG PET imaging.

Results: Individuals with higher baseline CVR exhibited greater biomarker positivity at baseline and 4 years later. Highest left and right inferior temporal CVR values were observed for non-demented participants with both amyloid and p-tau positivity. Conversely, lowest inferior temporal CVR was seen in cases negative for both biomarkers. Intermediate CVR values were observed where only one biomarker was present. Relationships between baseline CVR and biomarker status 4 years later, were comparable. Among individuals with greatest biomarker positivity, those with elevated CVR also exhibited poorest cognitive performance.

Conclusions: Increased CVR is associated with concurrent and later AD biomarkers. Furthermore, among those with greatest biomarker positivity, higher CVR is associated with worse cognition. These effects remain even after controlling for neuronal metabolism, suggesting observed pathology is driven by cerebrovascular dysfunction rather than reduced neuronal activation. Increased cerebrovascular resistance may therefore represent an early stage in neurodegenerative processes, possibly predating neuropathological changes such as amyloid retention and aberrant tau phosphorylation.

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H. YOSHIZAWA, M. SEKI, K. ABE & K. KITAGAWA. The Neural Substrate of Memory; A Study of Early Stage Alzheimer's Disease Using Structural MRI and Cerebral Perfusion SPECT.

Objective: To investigate the neural substrate of memory and executive functions in early stage Alzheimer's disease (AD) who underwent an extensive neuropsychological examination, MRI, and SPECT.

Participants and Methods: This study was conducted on a subset of 86 participants who presented with memory disturbance at our memory clinic and meet the criteria for mild cognitive impairment (MCI) or early stage probable AD. The CDR of all participants were not greater than 1. The average score of Mini Mental State Examination (MMSE) was 24.1 (SD 3.1). Neuropsychological testing included the verbal and visual memory test, verbal fluency tests, digit span, Symbol Digit Modalities Test, trail making test, and Frontal Assessment Battery (FAB). All MRI imaging data were acquired using a 3T Siemens Skyra MRI scanner. The cortical thickness, the volumes of total brain, thalamus, amygdala, entorhinal cortex, parahippocampal gyrus, total hippocampus, and hippocampal subfields were obtained using FreeSurfer software based on 3D-T1 and 3D FLAIR images. The volume of white matter hyperintensity (WMH) was calculated using 3D slicer based on 3D-FLAIR image. Cerebral blood perfusion was assessed using SPECT with 99mTc-ECD, and the SPECT data were analyzed by SPM 8.

Results: MRI-derived volumes of total brain, mean hippocampus, PVH, and DWMH were 1432.7±120.1cm^3, 3.34±0.59cm^3, 13.00±11.56cm^3, and 3.84±5.02cm^3, respectively. SPM 8 showed that total MMSE score was associated with the brain perfusion of left posterior cingulate gyrus; total FAB score was associated with the brain perfusion of both frontal lobes. MRI volume analysis showed that the verbal memory was associated with left hippocampus (p=0.018) and entorhinal cortex (p=0.023), and visual memory was associated with left and right of hippocampus (p=0.015 / p=0.048), entorhinal cortex (p=0.026 / p=0.003), and parahippocampal gyrus (p=0.029 / p=0.001).

Conclusions: Our findings confirm previous research on the specific roles of hippocampus and posterior cingulate gyrus in episodic memory.

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A.R. ZAMMIT, C.B. HALL, M.J. KATZ, G. MUNIZ-TERRERA, D. BENNETT & R.B. LIPTON. Neuropsychological latent classes at enrollment linked to Alzheimer's neuropathology upon autopsy.

Objective: To determine if latent class (LC) membership at study enrollment maps onto neuropathological outcomes at autopsy.

Participants and Methods: Participants were from the RUSH Memory and Aging Project (MAP) and the Religious Orders Study (ROS). LC analysis was performed on 10 neuropsychological measures. ANOVAs on pathology outcomes with class membership as the independent variable were run.

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Results: 1,502 participants (MAP=805, ROS=697; mean age at enrollment = 80.1, SD = 6.8; 68.4% female) were included. Median time from enrollment to autopsy was 8.5 years. Five LCs were identified: Mixed-Domains Impairment (n = 67, 4.5%), Memory-Specific Impairment (n = 297, 19.8%), Frontal Impairment (n = 239, 15.9%), Average (n = 709, 47.2%), and Superior Cognition (n = 189, 12.6%). ANOVAs showed clear differences in global burden of AD pathology as well as in beta-amyloid load (Aβ) and PHF tau tangle density counts across the classes: Mixed-Domains Impairment had the most AD burden (mean = 0.92, SD = 0.8) vs. Superior Cognition Class which had the least (mean = 0.62, SD = 0.6). Memory-Specific had the highest counts of Aβ(mean = 5.1, SD = 4.2) while the Mixed-Domains had the highest amounts of Tau (mean = 11.4mm^2, SD = 13.8); the Superior Cognition had the least amounts of both Aβ(mean = 3.8, SD = 4.1) and PHF Tau (mean = 4.8mm^2, SD = 6.4). Similar trends for vascular pathology emerged: Up to 43% of participants in the Frontal-Impairment class had at least 1 gross chronic macro infarct. Relationships also emerged for measures of cognitive reserve (CR): Superior Cognition had the highest CR indices (education = 18.7, SD = 3.2, NART = 9.1, SD = 1.5, cognitive resources age 12 = 4.8 SD = 1.9 and age 40 = 6.5, SD = 1.3) and Mixed-Domains the least (education = 12.7, SD = 4.4, NART = 5.5, SD = 3.1, cognitive resources age 12 = 2.7 SD = 2.2 and age 40 = 4.9, SD = 2.1).
Conclusions: Lifelong CR and components of pathology substantiate LCs as they provide insight into the underlying reserve and biological characteristics in the brain.
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Dementia (Non-AD)

J.J. BOSCARINO, A. ALSEMARI & E. ROSOWKSY. Exploring Potential Risk Factors of Frontotemporal Dementia Subtypes.
Objective: We sought to explore the possible risk factors of FTD subtypes among a sample of patients diagnosed with behavioral variant frontotemporal dementia (bvFTD) and primary progressive aphasia (PPA). We also examined the risk factors of the following PPA subtypes: semantic dementia (PPA-S), logopenic PPA (PPA-L), and nonfluent/agrammatic PPA (PPA-NF), as well as the potential risk factors of tau and TDP-43.
Participants and Methods: In this study, we used data obtained from the National Alzheimer's Coordinating Center (NACC) Uniform Data Set (UDS) from January 2015 to December 2017. In particular, we explored demographic, medical, and psychiatric information among a sample of patients diagnosed with bvFTD (n = 87), PPA (n = 78), PPA-S (n = 17), PPA-L (n = 43), PPA-NF (n = 24), tau (n = 34) and TDP-43 (n = 38). First, we conducted independent t-test analyses to assess for significant demographic differences between FTD patients and a normal cognition comparison group (n = 1,989). Next, we conducted backwards stepwise binary logistic regression analyses, which controlled for age and sex as per t-test results.
Results: Our analyses revealed risk factors of bvFTD were family history of FTD, sleep apnea, stroke, heart attack, and anxiety. Anxiety and traumatic brain injury (TBI) with brief loss of consciousness were risk factors of PPA. Further, neurodevelopmental disorders were a risk factor of PPA-S. No significant risk factors were found for PPA-NF and PPA-L. Risk factors of tau were insomnia, diabetes, and TBI with brief and extended loss of consciousness. Family history of FTD, anxiety, and sleep apnea were found to be risk factors of TDP-43.
Conclusions: Limitations for this study include a small sample size, participant reported medical history, lack of information regarding the neurological distribution of neuropathologies, and the temporality of the relationship between these potential risk factors. Further investigation on the association between the risk factors of FTD and their neuropathologies is advised.
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G. CHANEY, C. CORONA, A. BAKKER, V. KAMATH & C. ONYIKE. Neuropsychiatric and Neuroanatomical Correlates of Approach and Withdrawal Behaviors in Frontotemporal Dementia.
Objective: Behavioral activation/inhibition (BIS/BAS) are theorized to underlie the regulation of approach/withdrawal behaviors. Their neural circuits innervate frontal regions disrupted in neurodegenerative conditions. It is posited that behavioral dysfunctions in frontotemporal dementia (FTD) arise from disturbances in these networks. We examined BIS/BAS in FTD phenotypes in relation to symptoms and cortical thickness.
Participants and Methods: The BIS/BAS scales, Neuropsychiatric Inventory Questionnaire (NPI-Q) items, Geriatric Depression Scale (GDS), and cortical thickness in the lateral/medial OFC and insula were examined in bvFTD (n=25), svPPA (n=18), and PNFA (n=13) from the Frontotemporal Lobar Degeneration Neuroimaging Initiative. We used MANCOVA to examine group differences on the BIS/BAS and multiple regression for relationships between BIS/BAS and symptoms and cortical thickness. Repeated-measures ANOVAs were used for changes in BIS scores from baseline, 6-months, and one-year, and BAS scores.
Results: FTD cohorts did not significantly differ on the BIS or BAS (p=0.11). Several significant relationships emerged between the NPI-Q measures and BIS/BAS (ps<0.05). Positive correlations were found between the right insula and the BAS for bvFTD and svPPA (ps <0.05). BIS and BAS scores did not significantly change (p=0.11; p=0.21), nor were there group differences on the BIS (p=0.21).
Conclusions: These findings corroborate prior work that demonstrated psychiatric and neural correlates between the BIS/BAS. The BAS levels were positively correlated with disinhibition in behavioral FTD, which fits with the theory of heightened reward responsiveness relating to disinhibition severity, where dysfunction results in symptoms such as aberrant conduct. Neuroanatomical findings differed from earlier work showing inverse correlation between BIS and left insula volume. Larger samples are warranted to examine the clinical value of these findings.
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G. CHERAN, T. FENG, S. LEE, M. MANOOCHEHRI, S. ZAWADZKI, M. MEINERDING, E. FALLON, T. LYNCH, J. HEIDEBRINK, H. PAULSON, E.D. HUEY & S. COSENTINO. Lifetime Drinking History in Preclinical Behavioral-Variant Frontotemporal Dementia (bvFTD).
Objective: Objective: This study sought to characterize lifelong alcohol consumption habits in preclinical behavioral-variant Frontotemporal Dementia (bvFTD). Although increased alcohol intake is traditionally associated with symptomatic bvFTD in the early stage, little has been done to examine consumption patterns in the stages of disease prior to diagnosis.
Participants and Methods: Participants & Methods: 57 subjects from five families carrying MAPT mutations completed interviews of drinking habits over the lifetime, using the Lifetime Drinking History (LDH) questionnaire. 12 subjects were mutation carriers, of which 6 were initially presymptomatic and were assigned a Clinical Dementia Rating (CDR) score of CDR=0, and 6 subjects showed questionable symptoms not fully meeting bvFTD diagnostic criteria and were thus rated CDR=0.5. LDH Variables including days per month that alcohol was consumed, and number of servings consumed per occasion, were spaghetti plotted over subject lifetime by age, as well as years to average familial age of onset. Lifetime prevalence of alcohol abuse was also assessed with the Structured Clinical Interview for DSM-IV Disorders (SCID).

Results: Results: Mixed effect models analyzed with and without covariates of age, education, and sex found no group differences in drinking habits between carriers and non-carriers. Fisher's exact test was used to compare alcohol abuse between groups and also found no significant differences, though alcohol abuse was indicated in 25% (3 of 12) of preclinical carriers, but just 15% (7 of 45) non-carriers.
Conclusions: Conclusions: No significant group differences were seen in the drinking habits of carriers and non-carriers, a finding which is notable given prior work with this same cohort showing reduced regional brain volume, lower neuropsychological test performance, and differences in psychiatric diagnoses across groups. Current findings suggest increased alcohol consumption may not be a reliable or common symptom of preclinical or prodromal disease.
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K. EVERSOLE, T.R. VALENTINE, A. BRYANT, C.O. NESTER, L. BOXLEY, L. RABIN & C. BLOCK. Expanding the Dementia Differential: An Unusual Case of Anti-CASPR-2 Encephalitis.
Objective: Contactin-associated protein (CASPR-2) plays a critical role in the distribution of voltage-gated potassium channels (VGKC) along myelinated axons. The first case of VGKC-related encephalitis mimicking frontotemporal dementia (FTD) was reported in 2007 and evidenced positive response to immunomodulatory treatment. We evaluated a 70-year-old Caucasian male who met criteria for FTD. Serial inpatient psychiatric admissions yielded additional diagnoses of bipolar and obsessive-compulsive disorders. Subsequent medical workup revealed autoimmune etiology consistent with anti-CASPR-2 encephalitis.
Participants and Methods: A single-case series design. Mr. X initially presented for outpatient neuropsychological evaluation in 2017. Further medical workup included neuropsychiatric/neurological examinations, neuroimaging, serological/cerebrospinal fluid panels, and standard lab panels. After IVIG therapy, neuropsychological re-evaluation was completed in 2018. Reliable change analyses were conducted.
Results: Estimated premorbid baseline was average, consistent with Mr. X's 12 years of education. During initial evaluation, he was unable to complete the Mini-Mental State Examination-2 (MMSE-2) due to confusion, distractibility, perseverative thinking, impulsivity, irritability, and agitation. Following IVIG therapy, his orientation and behavior were improved enough to allow for full neuropsychological evaluation. Reliable change analyses indicated significant improvement. Neurocognitive performance correlated with caregiver reports of cognitive, psychiatric, and behavioral improvements.
Conclusions: This case study contributes to a growing literature implicating the immune system in dementia pathology. It highlights a potentially treatable pathogenetic mechanism in patients diagnosed with FTD. In addition to calling attention to dementia differential diagnosis, this case exemplifies how delayed diagnosis and immunomodulatory intervention can yield positive effects on disease-related neurocognitive and neuropsychiatric symptoms.
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L.H. JÜTTEN, R. MARK & M.M. SITSKOORN. Can Mixed Virtual Reality Simulator Into D'mentia Enhance Empathy and Understanding in Informal Dementia Caregivers?
Objective: To examine whether the mixed virtual reality dementia simulator Into D'mentia, wherein people experience what it is like to live with dementia, increased informal caregivers' understanding for people with dementia, their empathy, sense of competence, relationship quality with the care receiver, and decreases burden, depression, and/or anxiety.
Participants and Methods: A quasi-experimental, longitudinal, study with 2 groups (intervention group, n = 145; control group, n = 56) was conducted. Participants were informal dementia caregivers. They completed 6 questionnaires, and semi-structured interviews one week before, one week after, 2.5 months, and 15 months after the intervention. Data were analyzed on both group- and individual level, using Linear Mixed Model analyses and Reliable Change Indices.
Results: 61% of the participants in the intervention group said that the intervention increased their understanding of the person with dementia. No significant differences were found between the two groups over time regarding empathy, sense of competence, relationship quality with the care receiver, burden, depression, and anxiety, at either group level or individual level.
Conclusions: The Into D'mentia intervention improved caregivers' understanding of dementia. Caregivers indicated that they had learned to be more patient, to take things more slowly, and to focus on positive aspects of caregiving. However, no significant change was found on the variables assessed via the questionnaires. Future research can consider enriching this intervention with other aspects like educational material, more simulations, and (group) sessions, tailored to the individual caregiver and his/her situation, and examine if these new interventions also yield change on questionnaires. These new, more personalized interventions for dementia caregivers could help caregivers better understand the persons with dementia they care for, to ultimately enhance the well-being of both caregivers and persons with dementia.
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T. PAULIN, G. SAVAGE & M. IRISH. Reduced Problem Solving in Behavioural Variant Frontotemporal Dementia.
Objective: Mental rigidity is a characteristic symptom of behavioral variant frontotemporal dementia (bvFTD), manifesting in an inability to generate effective strategies when confronted with novel problems. Despite carers frequently reporting this symptom, formal investigation is lacking in the literature and the mechanisms that drive this symptom remain poorly understood.
Participants and Methods: Patients with bvFTD (n=15; M age=66 years) and healthy older adults (n=15; M age=68 years) completed the Means End Problem Solving (MEPS) task as well as a standard neuropsychological test battery. The MEPS task comprises a series of vignettes containing a social problem that arises in the beginning and is resolved by the end. Participants were presented with the beginnings and ends of each vignette, and were required to produce the middle steps that were taken to reach the resolution to the problem. The total number of steps produced for each vignette was recorded and rated for effectiveness. Additionally, the responses were coded for internal (episodic) and external (semantic) details.
Results: The total number of steps produced was significantly reduced in bvFTD patients when compared with healthy older adults. Furthermore, the steps produced to solve each problem were less effective in reaching the resolution. In addition, bvFTD patients were observed to provide fewer internal (episodic) details than healthy older adults. Pearson correlations revealed a significant, positive association between MEPS task performance and memory integrity on the ACE-III memory subscale in bvFTD patients.
Conclusions: This is the first study to investigate performance on the MEPS task in bvFTD. Our findings highlight a profound inability to engage in effective problem-solving strategies. The observation of a robust correlation between MEPS performance and episodic memory integrity suggests the intriguing possibility that medial temporal lobe dysfunction in bvFTD may underlie the impaired capacity to solve novel problems.
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D. RADMANESH, V. TRAN, J. GARCIA & A. STRIPLING. Depression Exacerbates Functional Impairments in Individuals with PPA.

Objective: To compare the extent to which depression impacts functional capacity in individuals with behavioral variant frontotemporal dementia (bvFTD) and individuals with primary progressive aphasia (PPA).

Participants and Methods: The current study consisted of 5,393 older adult participants (referred, recruited, and volunteers from the community) who completed the Functional Activities Questionnaire (FAQ). Researchers conducted a MANCOVA to examine whether depression influences the severity of functional ability in participants who were diagnosed with bvFTD and those who were diagnosed with PPA. Depression was used as a covariate.

Results: Results revealed a significant overall effect for the model at α=.05, $F(10, 5{,}381) = 330.800$, $p < .001$. Tests of between-subjects effects using a Bonferroni adjustment showed a significant difference in functional impairment between the bvFTD and PPA groups across all FAQ items. Further analyses, using depression as a covariate, revealed differences in functional impairments between the two groups disappear on four (i.e., bills, taxes, games, and meal preparation) of ten FAQ items.

Conclusions: Functional capacity is often preserved much longer in individuals with PPA when compared to those with bvFTD (Bott, Radke, Stephens, & Kramer, 2014). As such, clinicians tend to focus primarily on managing language deficits rather than functional impairments in patients with PPA. However, one-third of individuals with PPA suffer from depression (Khayum, Wieneke, Rogalski, Robinson, & O'Hara, 2012). Results from the current study suggest that psychiatric factors may reduce functional capacity to a level seen in patients diagnosed with bvFTD. Compromised functional capacity may diminish potential therapeutic gains derived from speech-language therapy and other rehabilitative interventions. Future research should examine how treating depressive symptoms, in addition to addressing language impairments, may promote individualized care and allow those with PPA to preserve functional independence longer.

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H.E. SILVERMAN, Y. GAZES, M. MANOOCHEHRI, J.S. GOLDMAN, M. TIERNEY, S. COSENTINO, J. GRAFMAN & E.D. HUEY. Bilateral Hypometabolism of Brodmann's Area 10 in Neurodegenerative Disease Linked to Reduced Prosocial Sexual Behaviors.

Objective: To characterize changes in sexual behaviors and intimacy in patients with frontotemporal dementia (FTD) compared to patients with corticobasal syndrome (CBS) and normal controls (NC), and to evaluate the neuroanatomical underpinnings of these changes.

Participants and Methods: Spouses of 30 patients with FTD, 20 patients with CBS, and 35 NC completed the Sexual Symptoms in Neurological Illness and Injury Questionnaire (SNIQ), which uses before and after item ratings to capture patient changes in sexual interest, inappropriate sexual behaviors, and prosocial sexual behaviors (i.e. romance, intimacy) since illness onset. 26 FTD and 15 CBS patients also received 18-flouoro-deoxy-glucose positron-emission topography (FDG-PET) scans to determine which regions were hypometabolic in association with specific sexual symptoms.

Results: Patients with FTD showed a greater decrease in prosocial sexual behaviors than patients with CBS [p=0.026] and NC [p<0.001], and a greater increase in inappropriate sexual behaviors than patients with CBS [p=0.009] and NC [p<0.001]. Patients with CBS showed a greater decrease in prosocial sexual behaviors than NC [p=0.040]. There was no group difference in change in sexual interest. The greatest change in both patient groups was in prosocial sexual behaviors. Neuroanatomically, only changes in prosocial sexual behaviors were correlated with hypometabolism, in the superior and medial frontal gyrus (Brodmann's Area 10) [p(FWE-corr)<0.001, k=286].

Conclusions: The most common sexual change found in patients with FTD was a decline in romantic intimacy and affection, which may reflect broader symptoms of apathy and impaired social cognition, followed by an increase in inappropriate sexual behaviors. Notably, patients with FTD did not show a significant change in sexual interest/drive. Changes in prosocial sexual behaviors were associated with hypometabolism in Brodmann's Area 10, supporting the theory that the changes reflect social-cognitive deficits due to frontal dysfunction.

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S.E. SUNDARAM, N. WALKER, A.M. STAFFARONI, M. CASEY, H. KANG, A. GOLUBJATNIKOV, K.B. CASALETTO, J. KRAMER & M. GESCHWIND. Baseline Neuropsychological Testing Predicts Survival Time in Sporadic Jakob-Creutzfeldt Disease.

Objective: While sporadic Jakob-Creutzfeldt disease (sJCD) has a rapidly progressive course, there is substantial variability in survival time, from months to ~2 years. Accurate prediction of survival is critical for clinical care and is important for patient stratification in clinical trials. Few studies have examined cognitive performance patterns in sJCD, with little known about objective cognitive predictors of survival time. We investigated which baseline cognitive domains predict survival time in sJCD.

Participants and Methods: 49 pathologically-confirmed sJCD participants [age: M(SD)=69.3(10.8); education: M(SD)=16.2(2.4)] completed a battery of neuropsychological tests at baseline. Using 135 matched controls, z-scores were calculated for each test and averaged to create four cognitive composite scores: memory, executive functions, spatial, and language. Composites were then averaged to create a global cognitive z-score. All patients were deceased at the time of analysis. Linear regression models were used to predict survival time while controlling for disease severity (Barthel Index).

Results: At baseline, sJCD patients performed significantly worse than controls on all four composites. Greater overall cognitive dysfunction at baseline predicted shorter survival time (p=.03). Specifically, greater visuospatial deficits at first visit were associated with reduced time to death (p=.01). Of the visuospatial tasks, copy of the Benson complex figure was a significant predictor of survival (p=.02).

Conclusions: sJCD patients exhibit a broad range of cognitive impairments at baseline; greater overall impairment and early visuospatial deficits predict survival time, consistent with reports of the Heidenhain Variant of sJCD which presents with visuospatial deficits and rapid decline. Baseline cognitive profiles may improve clinical care and treatment trials looking to stratify patients by disease course; future work should evaluate the incremental value of cognition compared to known predictors of survival such as Codon 129.

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B.P. TAYLOR, L. ROTBLATT & M. MARSISKE. Hispanic Status Moderates Effects of Cognitive Impairment Risk Factors.

Objective: One major area of health disparities appears to be in dementia, where greater risk has been reported for persons of Hispanic origin than for non-Hispanic persons. The current study investigated whether Hispanic status might moderate the effect of common risk factors in the prediction of cognitive impairment.

Participants and Methods: The current study is a secondary analysis of baseline data from a subset of National Alzheimer's Coordinating Center (NACC) participants. Included in these analyses were 13,459 cognitively-diverse, white participants aged 60-109, 55.6% female, 5.8% Hispanic. In a multinomial regression, the dependent variable was cognitive status (cognitively normal [CN], or mild cognitive impairment [MCI]; dementia [DEM] was the reference group). Risk factor

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predictors were sex, age, ApoE4 positivity, and education. The main effect of Hispanic status, and its interaction with these risk factors, was also examined.
Results: Older age, ApoE4 positive status, lower education, and Hispanic status were associated with higher odds of being DEM rather than CN. Increased age, lower education, and ApoE4 positive status were also associated with higher odds of being DEM rather than MCI. Hispanic status moderated the effects of age and ApoE4 status: Higher age was associated with a larger odds of being DEM rather than CN, and of being DEM rather than MCI, in Hispanic elders than it was in non-Hispanic elders. In contrast, ApoE4 positivity was associated with a lower odds of being DEM rather than MCI in Hispanic elders than it was in non-Hispanic elders.
Conclusions: The current study replicates previous findings suggesting that ApoE4 positivity is a smaller unique risk factor in Hispanic elders. With the caveat that the NACC sample may not be representative of all US elders, our future work will seek to elucidate the mechanisms that attenuate this ApoE4 effect in Hispanic elders.
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M.E. WIGGINS, F. ARIAS, C. HERNAIZ, L. ANDERSON, K. TAYLOR, M. WICKLUND & C. PRICE. Unmasking Frontotemporal Dementia Behavioral Variant via Elective Surgery: A Case Report.
Objective: At least 26-33% of older adults present for surgery with undiagnosed cognitive impairment (Culley et al., 2016; Amini et al.,2018). A preoperative cognitive assessment conducted in the perioperative anesthesia clinic at the University of Florida helped identify an older patient at-risk for cognitive decline. The patient chose to undergo surgery, and his symptoms manifested into acute cognitive and behavioral changes now diagnosed as behavioral variant frontotemporal dementia (bvFTD).
Participants and Methods: A 72-year-old, right-handed, college-educated, Caucasian male underwent an elective resection of a left temporal meningioma. He completed a five-minute cognitive screener during his visit to the perioperative clinic, followed by neurobehavioral examination suggesting mild cognitive impairment, mixed features. Surgery and anesthesia were without complication. Acute delirium occurred and persisted for ~2weeks. A post-operative neuropsychological protocol was completed one month later followed by fluorodeoxyglucose Positron Emission Tomography (FDG-PET).
Results: Pre-post neuropsychological testing identified significant declines in frontal motor control, working memory, inhibitory function, and abstract reasoning. Memory was impaired. Emotionally, he showed increased disinhibition and aggression. Naming and visuospatial were average or higher. FDG-PET imaging was consistent with bvFTD.
Conclusions: This is the first documented case report of likely bvFTD acceleration following a major elective surgery. To date there have been no prospective studies following patients with prodromal MCI, AD, or FTD through surgeries. Therefore, we do not know how these patients respond to the perioperative process and if diseases accelerate due to the surgical/anesthesia stressors. This case report argues for the value of preoperative cognitive assessments, particularly for older adults having surgical and anesthesia procedures.
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J. WOOD, T. GEFEN & S. WEINTRAUB. Montreal Cognitive Assessment (MoCA) Performance and Domain-Specific Index Scores in Amnestic Versus Aphasic Dementia.
Objective: The Montreal Cognitive Assessment (MoCA) is a screening tool for detecting cognitive impairment in older individuals. The MoCA yields a total score to represent general level of cognitive ability. The total score contains items that can generate index scores within each of the following six domains: 1) Memory; 2) Executive; 3) Attention; 4) Language; 5) Visuospatial; and 6) Orientation. It remains unclear whether MoCA Index scores differentiate among distinct clinical dementia syndromes. The current study compared MoCA Index scores between normal controls, patients with clinically diagnosed mild Dementia of the Alzheimer's Type (DAT, amnestic) or with primary progressive aphasia (PPA, aphasic).
Participants and Methods: Total MoCA scores (maximum = 30) and domain-specific Index scores were calculated from initial administration of the MoCA in patients followed longitudinally at the Northwestern Alzheimer's Disease Center. Groups included those with mild DAT (N = 33), PPA (N = 37), and cognitively normal control subjects (N = 83). ANOVAs adjusted for age followed by posthoc pairwise comparisons with Bonferroni corrections were used to compare MoCA total and Index scores among the three groups.
Results: MoCA total scores were significantly lower for each patient group compared to the control group (mean = 26.08; SD = 1.93; $p < 0.001$), but not for the DAT (mean = 18.94; SD = 3.32) compared with the PPA group (mean = 20.97; SD = 3.59). DAT patients scored significantly lower on Memory and Orientation Index scores compared to normal controls and PPA patients ($p < 0.001$), whereas PPA patients scored significantly lower in Language and Attention Index scores compared to both other groups ($p < 0.001$).
Conclusions: MoCA Index scores can distinguish between amnestic and aphasic dementia phenotypes despite no difference in total score.
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R. ZENISEK & A. BONNER-JACKSON. Examining the Relationship Between the Test of Practical Judgment (TOP-J), Neurocognitive Measures, and Informant-Rated Functional Ability.
Objective: Neuropsychological evaluations of older adults routinely include measures of judgment and functional ability. The Test of Practical Judgment (TOP-J) is an interview-based measure designed to assess judgment and everyday problem solving abilities. While judgment in older adults is typically thought to fall under the broad domain of executive functioning, there is a paucity of research investigating the relationship between judgment, cognitive abilities, mood symptoms, and functional ability. This study investigates these relationships in a heterogeneous outpatient memory clinic.
Participants and Methods: Participants included 565 individuals aged 37-89 years with an average of 14.8 years of education. Individuals were administered the TOP-J in the context of a comprehensive neuropsychological assessment completed as part of routine clinical care. Correlation coefficients were calculated to examine the relationship between TOP-J and measures of cognition and mood. A subsequent regression model was used to evaluate the ability to predict scores on an informant-rated functional ability measure from the TOP-J and related cognitive measures after controlling for age and education.
Results: Correlation statistics revealed significant correlations between the TOP-J and cognitive measures across domains of language, memory, visuospatial skills, processing speed, and executive functioning, and a self-report measure anxiety. Regression analyses revealed that the TOP-J predicted functional ability when controlling for age and education but did not add additional predictive utility beyond that of other cognitive measures, particularly measures of executive functioning.
Conclusions: These findings suggest that while the TOP-J is related to functional abilities, it does not add additional utility beyond neurocognitive measures in predicting functional abilities in a heterogenous sample of individuals being assessed in an outpatient memory disorder clinic.
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MCI (Mild Cognitive Impairment)

M. ABRAHAM, M. SEIDENBERG, K.A. NIELSON, J.L. WOODARD, J. SMITH, S. DURGERIAN & S. RAO. Characterizing Cognitively Intact APOE ε4 Carriers Who Subsequently Convert to MCI: A 5-Year Follow-up Study.

Objective: Carriers of the APOE ε4 allele are at increased risk for conversion to mild cognitive impairment (MCI) and Alzheimer's disease (AD). Not all ε4 carriers, however, develop MCI/AD. The purpose of this study was to compare cognitive measures and MRI volumes at entry among MCI converters and non-converters over a 5-year longitudinal study. We hypothesized that subtle cognitive and brain differences at baseline may predict conversion to MCI.

Participants and Methods: We recruited 29 cognitively intact ε4 carriers. At the end of the five year interval, 10 carriers (34.5%) were diagnosed with MCI. Conversion was based on change scores on the Mini Mental Status Exam (MMSE), the Dementia Rating Scale-2 (DRS-2), and the Rey Auditory Verbal Learning Test (RAVLT). Independent sample t-tests compared converters versus non-converters.

Results: At study entry, all subjects performed in the normal cognitive range. The converters, however, scored lower on the MMSE ($p < 0.001$), RAVLT Trials 1-5 ($p = 0.02$), RAVLT Immediate Recall ($p = 0.005$), RAVLT Delayed Recall ($p = 0.04$), and DRS Total Score ($p = 0.03$) compared to non-converters. Similarly, converters had smaller MRI volumes in the right parasubiculum ($p = 0.02$) and right presubiculum ($p = 0.01$) than non-converters.

Conclusions: Cognitively intact ε4 carriers do not all uniformly develop MCI or AD. Despite scoring within the normal range on all neuropsychological tests at baseline, those carriers who converted to MCI within 5 years exhibited lower cognitive test scores and smaller medial temporal volumes than non-carriers at study entry. These results suggest that subtle cognitive and volumetric changes can precede the diagnosis MCI in e4 carriers.

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M. ABRAHAM, M. SEIDENBERG, K.A. NIELSON, J.L. WOODARD, J. SMITH, S. DURGERIAN & S. RAO. Patterns of Category Fluency Performance in Mild Cognitive Impairment.

Objective: Individuals with mild cognitive impairment (MCI) typically produce fewer total words than healthy controls (HC) on category fluency tasks (CF). Few studies have examined qualitative indices in MCI and HC, particularly in relation to APOE status. The current study compared CF performance on total words, switching, and clustering across 4 time intervals between cognitively intact APOE ε4 carriers and APOE ε4 non-carriers, and an MCI group. The relationship of CF indices with MRI hippocampus volumes was also examined.

Participants and Methods: Sixty participants (ages 70-86) were divided into 34 cognitively intact ε4 non-carriers, 15 cognitively intact ε4 carriers, and 10 MCI. There were no group differences in age and education. On an animal fluency task, total words, clusters, and switches were examined at 15-second time intervals. Analyses of Variance examined group differences on these indices. Correlational analyses examined relationships with hippocampal MRI volumes.

Results: There were no significant differences between cognitively intact groups for CF indices, regardless of APOE status. The MCI group produced fewer total words ($p = .001$) and fewer switches ($p < .01$) compared to ε4 carriers and ε4 non-carriers (p's $< .002$). There were no group differences for clusters. A group by time interaction revealed that the MCI group generated significantly fewer words, particularly after the initial 15-second interval ($p = .02$). More total words and switches were significantly correlated with left and right hippocampus volumes (p's $< .05$).

Conclusions: Impairments in CF performance may not be evident until other aspects of cognitive decline, such as episodic memory, become evident. Findings also indicate the importance of examining distinct time intervals in CF. Of interest, total words and switches were significantly correlated with bilateral hippocampus volume, which is relevant to discussions of the hippocampus role in semantic memory.

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P.A. AMOFA, B. DEFEIS, M. CHANDLER, D. LOCKE, J.A. FIELDS, V.S. PHATAK, P.M. DEAN, S. LEVY & G. SMITH. Adherence to Behavioral Interventions to Prevent/ Delay Dementia.

Objective: Behavioral interventions during the early progressive stage of memory decline hold promise in delaying the development of a dementia. In the present study, participants in the PCORI behavioral intervention study were analyzed for full treatment adherence, diffusion to treatment, and predictors of treatment adherence.

Participants and Methods: Participants (N=272, mean age=75.04 ±7.54) diagnosed with amnestic Mild Cognitive Impairment (MCI) were randomly assigned to 1 of 5 intervention combinations. Each treatment group consisted of 1 hour each of 4 out of 5 behavioral interventions – yoga, memory compensation training, computerized cognitive training, support groups, and wellness education. Length of study was 4 hours per day for 10 days with follow-up at 6 months.

Results: Only 239 participants completed the 6-month follow up measures. Frequency analysis showed that 36% of participants (n=88) were fully adherent to only 1 intervention, 33% (n=79) were fully adherent to 2 interventions, 18% (n=44) were fully adherent to 3 interventions, and 4% (n=10) were fully adherent to all 4 interventions from their treatment group, while 7.5% (n=18) showed no adherence to any interventions in their treatment group. Full diffusion to treatment was present in 25% of participants (n=60) during the 6-month follow-up. Regression analysis showed higher education and higher Functional Assessment Questionnaire (FAQ) scores predicted full adherence to more interventions 6 months post treatment (R^2=.073 F(8,220)=2.172, p<.03).

Conclusions: It is important to determine if adherence to one or more behavioral interventions will have differential impact on our desired outcome-delayed onset of dementia. In the present study, about 91% of the study participants were adherent to at least one intervention 6 months post treatment. Level of education and functioning also played a factor in a participant's engagement in more interventions.

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A. BAIRD, J. SMOTHERMAN, S. SALLEY, J. CALLAHAN & N. WISDOM. Depression and Cognitive Functioning in Former NFL Players.

Objective: Many studies have observed an association between depression and cognition including deficits in memory, attention, and executive functioning; however, inclusion of performance and symptom validity tests is often overlooked. The purpose of this study was to examine the effect of depression on cognitive performance in retired National Football League (NFL) players who passed both performance and symptom validity tests.

Participants and Methods: Participants included 141 retired NFL players referred for a comprehensive neuropsychological evaluation as a part of the NFL Players' Concussion Injury Litigation Class-Action Settlement. 50 Participants were omitted from the study after meeting the Slick criteria (1999) for Definite or Probable Malingered Neurocognitive Dysfunction. Similar to the methodology of Rohling et al. (2002), participants scoring in the top ($T \geq 65$) and bottom ($T \leq 46$)

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quartiles on the RC2 scale (Low Positive Emotions) from the MMPI-2-RF were categorized into High (n=23) and Low (n=28) Depression groups. One-way ANOVA was used to compare the two groups across all measures of cognitive functioning.
Results: There were no significant demographic differences between the groups. In addition to symptoms of depression (RC2), the High Depression group also endorsed significantly more cognitive complaints (COG) on the MMPI-2-RF. The High Depression group performed significantly poorer on WMS-IV Logical Memory I; however, no other significant differences were observed across the remaining 27 measures of cognitive functioning.
Conclusions: Contrary to common lore, the findings from this study indicate depression does not significantly impact cognitive functioning. Future studies should continue to include measures of validity when examining the relationship between cognition and psychiatric functioning.
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M. CLARENS, L. CRIVELLI, M. HELOU, M.E. MARTIN, P. CHREM MENDEZ & R. ALLEGRI. Use of a Screening Test (Moca) to Predict Amyloid Physiopathology in Mild Cognitive Impairment.
Objective: The MOCA Screening Test (Montreal Cognitive Assessment) has become relevant in recent years in the screening of patients with Mild Cognitive Impairment (MCI). In 2017, the UDS 3 (Uniform Data Set) of the ADC program (Alzheimer's Disease Centers) of the National Institute of Aging proposes it in its neuropsychological evaluation as a screening test. The objective of the following work is to analyze the MOCA and its cognitive sub-scores and the relationship with amyloid physiopathology underlying AD.
Participants and Methods: 32 patients with MCI were studied, separated according to positive amyloid underlying physiopathology (n: 20) and negative (n: 12). Patients were evaluated through an extensive cognitive evaluation that included MOCA test.
Results: MOCA Total Score yielded significantly different results between groups ($p < 0.001$) as well as the Memory Score (MOCA MIS), the Executive (MOCA EIS), the Attention Score (MOCA AIS) ($p < 0.001$) and the Orientation score. (MOCA OIS) ($p < 0.05$). Patients with amyloid physiopathology had worse performance in these scores.
Conclusions: MOCA test is a useful tool for evaluation of patients with mild cognitive impairment due to Alzheimer's disease. Future studies should study this test in prodromal phases of the disease.
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M. CLARENS, P. CHREM MENDEZ, L. CRIVELLI, M.E. MARTIN, I.L. CALANDRI, J. CAMPOS & R. ALLEGRI. Neuropsychological Profiles of Alzheimer's Disease in Patients with Amyloid Physiopathology According to age.
Objective: The limits between cognitive changes related to normal aging and the first symptoms of AD are sometimes difficult to define since structural and functional changes in AD can overlap with changes in normal aging or other neurodegenerative diseases. The evolution of AD pathophysiological process according to age remains poorly studied from a neuropsychological perspective. Our aim is to compare the neuropsychological profile of younger old (<70 yo) and oldest old (>70yo) patients with amyloidphysiopathology in our country.
Participants and Methods: We studied 83 patients with MCI with amyloid physiopathology. They were separated according to age group, under 70 (n: 40) years and over 70 years (n: 43).
Results: The performance between groups was compared using standardized scoring .Younger patients showed significant worse performance in Total Learning, and the distractor list ($p<0.05$) than older patients, hence having a less severe neuropsychological profile in memory.
Conclusions: The typical amnestic profile of AD would seem to be more salient in younger patients with amyloid physiopathology. The milder impairment in older patients could suggest a less aggressive AD presentation related with aging.
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C. COHEN, J. NOVITSKI, C. WILLIAMS & M. SEIDENBERG. Alternate Form Reliability and Validity of Semantic Fluency in Mild Cognitive Impairment.
Objective: Semantic fluency tasks are commonly used in neuropsychological assessment of older adults. Often, different categories are used as alternate forms in clinical and research studies. Here we examined reliability and discriminative validity of fluency scores for three categories; animals (A), fruits and vegetables (FV), and musical instruments (MI) for cognitively intact (CI) and MCI (Mild Cognitive Impairment) participants.
Participants and Methods: 27 CI (mean age 78 years) and 17 MCI (mean age 81 years) were asked to produce exemplars for A, FV, MI, over 60 seconds using standard fluency directions. No group differences in age or education. MCI was determined based on Peterson criteria. Total Words (TW) was scored based on standard fluency guidelines. Pearson correlations and t-tests were used for analyses.
Results: Bivariate correlations for CI group showed a moderate correlation between all three categories (.70-.75, $p < .01$). Correlations for MCI group also revealed a moderate correlation between all three categories (.61- .68, $p < .05$). Independent samples t-tests showed a significant difference in total word scores between groups ($p < .001$); CI produced more words than the MCI group for all three categories (d= 1.31-1.74).
Conclusions: All three fluency categories produced very similar correlations for HC and MCI and similar discriminative significance between the groups. Findings support the use of alternate forms for these three categories.
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A.N. CORRERO, K. REITER, S. FRANCZAK, E. ULMER, D. SABSEVITZ & L. GLASS UMFLEET. Amnestic Mild Cognitive Impairment: Delineating Storage Versus Retrieval-Based Memory Impairment Using Quantitative MRI.
Objective: Amnestic mild cognitive impairment (aMCI) refers to a pattern of performance deficits on neuropsychological tests of learning/memory without functional impairment. Importantly, the traditional classification (i.e., Petersen criteria) does not demarcate whether weaknesses are due to problems with memory storage or retrieval. These processes are associated with unique neuroanatomical structures, and aMCI diagnoses may be better understood by accounting for these differences. As such, this study compared brain volumes in aMCI subtypes by using standardized quantitative methods (i.e., Neuroreader).
Participants and Methods: Participants were 33 adults who completed comprehensive neuropsychological evaluations and quantitative MRI volumetrics with Neuroreader. Both methods provide standardized scores. Diagnoses of aMCI were based on the Petersen criteria (objective memory deficit at least 1.5 standard deviations below age-matched peers). Patients were further grouped based on the pattern of memory problems: storage-based (n = 17, impaired delayed recall and recognition) or retrieval-based (n = 16, impaired delayed recall and better recognition relative to recall).
Results: Independent t-tests were used to compare brain volume z scores between the aMCI groups. No significant differences emerged. Hippocampal z scores were then compared with cortical and subcortical regions of interest within each group using paired-samples t-tests. Retrieval-based aMCI had lower z scores for temporal lobes (M=-.92, SD=.56, $t(15)$=2.16, p<.05) compared to hippocampal volumes (M=-.54, SD=.66). However, this pattern was not significant for storage-based aMCI.

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Conclusions: Memory retrieval involves widespread activation of the temporal lobes. As such, retrieval-based aMCI is characterized by structural discrepancies between the hippocampus and temporal lobe. These preliminary data support delineating aMCI diagnoses based on the pattern of memory deficits. Neuroreader may have practical utility as a biomarker in demarcating MCI subtypes.
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L. DE WIT, V. DOTSON & G. SMITH. Progression to Dementia in Mild Cognitive Impairment with Alzheimer's Etiology: Contributions of Vascular Pathology and Depression.
Objective: Depression is known to accelerate progression to dementia. Whether progression to dementia occurs faster in the presence of comorbid vascular pathology in individuals with Mild Cognitive Impairment likely due to Alzheimer's Disease (iwMCI-AD) is currently unknown. Further, it is unclear if depression accelerates progression to dementia beyond the effects of vascular pathology. The current study extends previous research by investigating clinical diagnoses of vascular pathology and depression as predictors of progression to dementia in iwMCI-AD.
Participants and Methods: Data on 6906 iwMCI-AD who were tested annually were obtained from the National Alzheimer's Coordinating Center (NACC; wave 2005-2018). Clinical diagnoses of AD, vascular pathology, and depression as primary, contributing, or noncontributing cause of cognitive impairment, given by clinicians based on neurologic, psychiatric, and neuropsychological data, were used as predictors. Stepwise logistic regression survival models examined whether vascular pathology and depression were associated with faster progression to dementia, controlling for age and education.
Results: Progression to dementia was faster for individuals with MCI due to a mixed AD and vascular pathology than for iwMCI-AD without vascular pathology (fitted survival: 0.415, $p < 0.005$). Adding depression as a predictor improved model fit ($p < 0.001$). Progression to dementia was faster for individuals with depression (fitted survival: 0.453, $p < 0.001$) while controlling for a vascular pathology. The proportionality assumption held.
Conclusions: Findings from the current study suggest that vascular pathology and depression are associated with accelerated progression to dementia in iwMCI-AD. Importantly, we found that depression accelerates disease progression beyond the effects of vascular pathology. Further research is needed to better understand possible mechanisms through which depression accelerates progression to dementia.
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B. DEFEIS, A. MEJIA, M. CHANDLER, D. LOCKE, J.A. FIELDS, V.S. PHATAK, P.M. DEAN & G. SMITH. An Exploratory Factor Analysis of MCI Intervention Variables in Participant-Partner Dyads.
Objective: Evidence suggests individuals with mild cognitive impairment (MCI) have benefited from participating in behavioral interventions. Participant and partner self-report are not only some of our only windows into the efficacy of interventions, but also into adherence to those interventions. However, most questionnaires are utilized with specific constructs in mind. The aim of this study was to discover covariance at the questionnaire and assessment level, given that questionnaire outcomes with significant inter-correlations may reflect unified latent variables.
Participants and Methods: Data were drawn from 218 pairs of participants with MCI and their partners at baseline as part of the Comparing Effectiveness of Behavioral Interventions to Prevent or Delay Dementia (CEBIPODD) intervention study. We used principal-axis factor extraction in an exploratory factor analysis to determine the factor structure with Promax rotation. Variables entered into the model were total scores for: participant and partner self-report of depression, anxiety, and quality of life; partner report of the participant with MCI's everyday cognition and functional ability; partner self-report of caregiver burden and mastery; and participant self-report of self-efficacy. Participant level of cognitive impairment and performance on the Dementia Rating Scale were included as measures of severity.
Results: Despite these variables targeting a variety of constructs, only three factors were identified for extraction that explained 60.8% of the variance. Respectively, factors could be characterized as partner distress (30.1%), participant distress (17.9%), and participant impairment (12.7%).
Conclusions: This analysis suggests that broad assessment of both patient and partner distress may provide the best overall predictors of intervention outcomes. Future directions include an item-level analysis of questionnaires within these factors and confirmatory factor analysis within a separate cohort of the intervention program.
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G. GUTIERREZ, B. DEFEIS, M. CHANDLER, D. LOCKE, J.A. FIELDS, V.S. PHATAK, P.M. DEAN & G. SMITH. Predictors of Adherence to a Computerized Brain Training Intervention in Older Adults with Mild Cognitive Impairment.
Objective: Computerized brain training paradigms are a simple, cost effective, and engaging form of cognitive intervention. Overall levels of adherence to brain training and the specific factors that predict adherence are unknown. Studying adherence could lead to protocol modifications and improvement of intervention outcomes. We examined predictors of adherence in a cohort of MCI patients to better understand why certain people with MCI are more or less likely to continue participating in computerized brain training interventions.
Participants and Methods: 195 participants characterized with MCI were enrolled in the Comparative Effectiveness of Behavioral Interventions to Prevent or Delay Dementia (CEBIPODD) intervention study. Participants were tasked with completing 40 hours post intervention using Brain HQ. Adherence 6 months after an intervention was divided into three levels, and these levels of adherence were modeled with ordinal regression using age, education, level of cognitive impairment, functional ability, cognitive ability, depression, anxiety, sex, and marital status as predictors.
Results: 52 (26.7%) of participants were fully adherent to the computerized brain training intervention and 47 (24.1%) were non-adherent. Older age, being married or partnered, and decreased functional ability predicted non-adherence to the brain training intervention.
Conclusions: Older age may be a barrier to computerized brain training interventions due to less familiarity with or difficulty adapting to the technological interface. Non-adherence resulting from decreased functional ability may reflect challenges in daily living. Being married or partnered may result in non-adherence due to poor modeling by the partner, or increased social engagement. Further understanding the patterns of demographic, cognitive, and behavioral variables that predict adherence to behavioral interventions can greatly improve the efficacy and outcomes of future endeavors.
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C.A. DIBLASIO, R. KENNEDY, M. CROWE, K. STEWARD, T.P. BULL & V. WADLEY. Association Between Life-Space Mobility and Brain Volume Differences in Older Adults with MCI.
Objective: Life-space (LS) mobility is an important functional construct that measures the extent to which an individual moves around their home and community. Previous studies have found that general cognitive function is associated to LS mobility in middle-aged and older adults. We examined the relationship between LS and regional brain volumes in persons with Mild Cognitive Impairment (MCI).

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Participants and Methods: Participants were 76 adults aged 54-88 (Mean age = 74 years; 49% male) referred to the Applying Programs to Preserve Skills (APPS) study with a working diagnosis of Mild Cognitive Impairment that was confirmed through an adjudication process using a comprehensive neuropsychological battery, medical history and informant report. The Life-Space Assessment (LSA) questionnaire was used to evaluate distance, frequency, and level of independence of participants' mobility. LSA scores range from 0-120 with higher scores indicative of greater mobility. Gray matter (GM) volume of regions established as markers of Alzheimer's Disease and cerebrovascular disease was assessed with Philips 3T structural MRI. The relationship between LSA score and regional brain volume, relative to total brain volume, was examined in regression models controlling for age and physical performance.
Results: We found a significant correlation between lower LS scores and reduced parietal lobe GM volume ($p < .01$). Reduction of 1% in parietal volume was associated with clinically significant 16 point change in LSA. Additionally, the relationship between lower LS scores and reduced temporal lobe GM approached significance ($p = .08$).
Conclusions: The findings provide preliminary evidence that differences in parietal lobe GM volume contribute to community mobility measured by life-space in individuals along the MCI continuum. This supports further research on the interrelationship between LS and cognition, specifically visuospatial function as one of the cognitive factors that influences LS.
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R. DIVERS, K. HACKETT, K. CLARK, R. MIS & T. GIOVANNETTI. Heterogeneity of Subtle Functional Impairment Across MCI Subtypes.
Objective: Mild Cognitive Impairment (MCI) is a disorder involving cognitive impairment beyond what is developmentally expected, but with less functional impairment than dementia. However, subtle functional changes are often seen in MCI and can worsen over time. Less is known about how various subtypes of MCI (amnestic vs. nonamnestic, single vs. multi domain) differ in terms of this subtle functional decline. The goal of this study was to examine subtle variations in functional decline among MCI subtypes.
Participants and Methods: Participants were classified as amnestic single domain ($N = 1573$), amnestic multi domain ($N = 1594$), nonamnestic single domain ($N = 503$), or nonamnestic multi domain ($N = 272$) by the National Alzheimer's Coordinating Center (NACC). Everyday functioning was assessed via the Functional Activities Questionnaire (FAQ), a 10-item informant-report questionnaire that asks about the participant's ability to perform everyday tasks. Group differences on the total FAQ score and each FAQ item were tested using nonparametric tests, because variable distributions were not normally distributed.
Results: Comparisons between amnestic and nonamnestic groups showed the amnestic single domain ($p = .04$) and amnestic multi domain ($p = .03$) groups had higher total FAQ scores than their nonamnestic group counterparts. Analyses of each FAQ item showed the amnestic single domain ($p < .001$) and amnestic multi domain ($p = .001$) groups had more difficulty remembering appointments, family occasions, holidays, and medications than the non-amnestic single/multi-domain groups.
Conclusions: MCI participants with an amnestic profile presented with more overall functional impairment because of difficulties with recalling past and future events that are not as problematic for their non-amnestic counterparts. The findings suggest that functional assessments for MCI should include a variety of items to ensure that a wide range of functional difficulties are evaluated and that interventions for MCI focus on supporting episodic memory.
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S. EMRANI, V.J. WASSERMAN, S. BALIGA, E.F. MATUSZ, M. LAMAR, C. PRICE, L. DELANO-WOOD, M. BONDI, R. AU, R. SWENSON & D.J. LIBON. Working Memory Test Performance in Statistically-Determined Patients with Mild Cognitive Impairment: An Analysis of Latency versus Accuracy.
Objective: Past research shows that 5-span Backward Digit Span Test (BDST) serial recall *accuracy*, a working memory (WM) measure, produces a linear/ negative slope differentiating mixed/ dysexecutive mild cognitive impairment (mx/dys MCI) from other groups. The current research examined how BDST *latency* including average time to completion and serial order latency can be used to characterize WM in MCI.
Participants and Methods: 39 patients were classified into amnestic (aMCI; n= 8), mixed/ dysexecutive MCI (mx/dys MCI; n= 8), and non-MCI (n= 23) groups using Jak, Bondi (2009) criteria. Group were equated for age, education, and MMSE. WM was assessed with the BDST that included a block of seven 5-span trials. Total serial order recall, serial order position latency, and average time to completion for all trials were analyzed.
Results: Serial order accuracy yielded a linear/ negative slope with *worse* recency recall for mx/dys MCI compared to other groups ($p < .050$, both analyses). Within-group analyses for patients comparing latency among all five serial order positions yielded a complex multiphasic pattern with *slowest* latency for position 1, followed by combined positions 3 and 4, and fastest latency for combined positions 2 and 5 ($p < .010$, all analyses). Bivariate correlation found that *slower* average time to completion was associated with *better* serial order recall ($r = .428$, $p < .021$). aMCI versus mx/dys MCI discriminant function analyses found that average time to completion correctly classified 84.6% of patients whereas serial order recall classified 73.3% of patients.
Conclusions: Slopes for BDST accuracy versus latency are distinctly different. Multi-phasic BDST latencies can be explained by a mechanism managing cross temporal contingencies that simultaneously keeps initial (serial position 1) memoranda active to facilitate subsequent recall (serial position 3 & 4). Thus, a higher-order construct coordinating near-past (serial position 1) with near-future (serial position 3 & 4) stimuli may underlie intact WM in MCI.
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S. EMRANI, V.J. WASSERMAN, S. BALIGA, E.F. MATUSZ, M. LAMAR, C. PRICE, L. DELANO-WOOD, M. BONDI, R. AU, R. SWENSON & D.J. LIBON. Response Latency as a Cognitive Biomarker of Working Memory Test Performance in Statistically-Determined Patients with Mild Cognitive Impairment.
Objective: Past research has shown that Backward Digit Span latency produces a complex, multi-phasic slope and can differentiate between mild cognitive impairment (MCI) and non-MCI groups. The current research sought to characterize working memory (WM) in MCI by examining latencies on a pointing span test comparing digit trials versus combined digits/letters trials.
Participants and Methods: 22 patients were classified into MCI (n=6) and non-MCI (n=16) using Jak, Bondi (2009) criteria. WM was assessed with an iPad WRAML-2 Symbolic Working Memory Test where patients were instructed to point to digits in ascending order; then point to digits in ascending order followed by letters in alphabetical order. Only correct trials were analyzed. Outcome measures were the average inter-response latencies (IRL) for 4-span digit and digit/numbers trials.
Results: Within-group analyses comparing first and final inter-response latency, where the first inter-response latency (First IRL) is the time between stimulus offset to position 1; and the final inter-response latency (Final IRL) is the time from position 3 to the initiation of the final position 4 response. T-test analyses yielded statistically significant differences for First IRL and Final IRL for both numbers and numbers/letters in the non-MCI group ($p < .001$, for both), while differences in

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First IRL and Final IRL was significant only for digit trials in the MCI group (p< .018). The average time for First IRL increased from digits to digit/letters in the non-MCI group but remained the same between conditions for MCI patients.
Conclusions: Within-group IRL differences suggest that overall correct responding requires more initial position 1 *'think'* time. Slower responding in the MCI compared to non-MCI patients regardless of task complexity provides a means to define how well patients can manage initial versus final cross temporal contingencies. These metrics also provide a more granular way to measure WM in MCI over and above simple correct responding.
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S. CLEARY, J.C. PEVEN, V.J. WASSERMAN, S. EMRANI, E.F. MATUSZ, R. SWENSON, M. LAMAR & D.J. LIBON. Neurocognitive Constructs Underlying Visuospatial Performance in Statistically-Determined Mild Cognitive Impairment.
Objective: Little research has examined cognitive constructs underlying non-constructional visuospatial abilities in patients with mild cognitive impairment (MCI).
Participants and Methods: Jak, Bondi (2009) criteria classified 93 patients into amnestic (aMCI; n=22) and combined mixed/dysexecutive MCI (mx/dys MCI; n=25) groups. 46 patients did not meet criteria for MCI (non-MCI). Non-constructional neuropsychological functioning was assessed using the Judgment of Line Orientation Test (JOLO) where performance was scored for correct total (0-60), oblique (0-19; items 3,4 & 8,9), and non-oblique responses (0-41). Z-score derived neuropsychological indices for working memory/processing speed (letter fluency, Trails B, WMS-Mental Control), language (BNT, animal fluency, WAIS-III Similarities), and memory (CVLT-short form trials 1-4, delay recall, delay recognition) were constructed. Groups were equated for age, education, and functional abilities. MMSE scores were higher for non-MCI patients than other groups (p< .008, both analyses).
Results: mx/dys MCI patients obtained fewer JOLO total (p<.014) and oblique (p<.006) correct responses than non-MCI patients with no differences for non-oblique responses. Regression analyses where non-oblique and oblique correct responses were dependent variables found that only oblique responses were associated with the working memory/processing speed index (r=.428, R^2=.183, df= 3, 69, p< .004, beta=.314, p< .022). Further regression analyses for working memory (WMS-IV Symbol Span/ WAIS-IV Digit Backward) and Processing Speed (Trails B/ WAIS-III Digit Symbol) found that only oblique response was associated with WMS-IV Symbol Span (r=.282, R^2=.080, df= 1,88, p< .044, beta=.194, p< .042); and WAIS-III Digit Symbol (r=.306, R^2=.094, df= 1,91, p< .005, beta=.288, p< .005) performance.
Conclusions: JOLO performance is worse in mx/dys MCI and may be subordinate to neurocognitive abilities such as working memory and processing speed abilities.
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O. GELONCH, M. VANCELLS, N. CANO, K. LIKHMANOVA, S. RAMOS, G. DE OLIVEIRA, P. RADEVA & M. GAROLERA. Autobiographical Event Exposure Training: a Promising Intervention for Amnestic MCI?
Objective: There has been considerable emphasis in recent years on non-pharmacological interventions for people with mild cognitive impairment (MCI) to improve cognition, though benefits are still limited. Over the last years, lifelogging wearable cameras have emerged as a new way to record the daily experiences and these can be an important choice to stimulate recent autobiographical memory. We aim to develop a pilot study to analyze the effect of one autobiographical session exposure on recall and memory self-efficacy in amnestic-MCI (aMCI) patients.
Participants and Methods: The study included 17 patients with aMCI (8 females; mean age=76,5; SD=5,15). Participants wore a small wearable lifelogging camera that took pictures automatically while they were doing their daily activities. One autobiographical event was chosen to be used in the intervention session, which consisted of a exposure training to the event followed by several questions about the event that the patient had to answer. Recall of the event was assessed using standardized procedure (Levine, 2002) that quantifies the number of details of the recall (ranges 0-15). Memory self-efficacy was assessed with a self-report questionnaire designed by the authors (ranges 0-100). Both measures were administered at baseline and at the end of the intervention session (post-training). Statistical analysis were performed using nonparametric Wilcoxon Signed-Rank test.
Results: Significant differences were found between baseline and post-training assessment, both for the recall (baseline M=4.18; post-traing M=5.82; p=0.016) and self-efficacy (baseline M=81.9; post-traing M=84.8; p=0.013) measures, with a better performance in the post-training. The observed effect size was large for recall (d=0.82) and low for self-efficacy (d=0.26) measure.
Conclusions: After a solely autobiographical event exposure training, aMCI patients showed improvements in recall and memory self-efficacy. These new technologies could become a promising non-pharmacological intervention for these patients.
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L. GAYNOR, R. CURIEL, A. PENATE, M. ROSSELLI, M. WICKLUND, D. LOEWENSTEIN & R. BAUER. Prediction of Mild Functional Impairment Related to Clinical Alzheimer's Disease Progression is Enhanced by Novel Object Discrimination Task.
Objective: The Clinical Dementia Rating (CDR) scale assesses the cognitive and functional abilities of older adults at risk for dementia. Recent studies have suggested that cognitive biomarkers, such as delayed story recall, may also contribute to the prediction of functional impairment in Alzheimer's disease (AD) progression. The purpose of the current study is to determine whether the performance of older adults on a novel object discrimination task can improve prediction of even milder impairments identified by the CDR-Sum of Boxes (CDR-SB) compared to a measure of delayed story recall.
Participants and Methods: One hundred thirty-five participants from the 1Florida Alzheimer's Disease Research Center with varying CDR-SB scores (Cognitively Normal= 0; Mildly Impaired= 0.5-2; Moderately Impaired= 2.5-4; Severely Impaired=over 4.5), completed a test of object discrimination (Object Recognition and Discrimination Task; ORDT) and delayed story recall in the context of a larger neuropsychological and clinical evaluation. A multinomial logistic regression was performed with age, education, delayed story recall, and ORDT score to determine which variables improved prediction of CDR-SB score.
Results: The logistic regression model was statistically significant (X^2(12)=58.4, p<0.001). The model explained 46% of the variance in CDR-SB. Compared to delayed story recall, which improved prediction of moderate and severe CDR-SB impairment compared to cognitively normal, the ORDT also improved prediction of mild impairment. Specifically, older adults were significantly more likely to be in the mildly impaired group compared to cognitively normal if they had lower ORDT scores. The model correctly classified 75% of mildly impaired cases.
Conclusions: Visual object discrimination improves prediction of even mild functional impairment occurring early in dementia progression, making it potentially useful as a very early cognitive biomarker in candidates for disease-modifying interventions.
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C. HARDCASTLE, M. AMIN, S. CROWLEY, D. VANDERBILT, M.E. WIGGINS, C. DION, L.P. HIZEL, J.J. TANNER, D. VAILLANCOURT, T. MARECI & C. PRICE. Hippocampal Free Water and Episodic Memory in Mild Cognitive Impairment.

Objective: Free-water (FW) imaging, a diffusion-weighted imaging analysis, provides information regarding water diffusivity in tissue and extracellular components. FW in white matter is associated with multiple neuropathologies and is possibly indicative of neuroinflammation. Less is known about FW in gray matter. Here, we explored the contribution of hippocampal and caudate nuclei FW on episodic memory and working memory for older adults and individuals meeting criteria for MCI.

Participants and Methods: Neuropsychological assessment and a 3T Siemens brain MRI were completed within 48 hours of each other. Hippocampi and caudate nuclei were segmented from FreeSurfer and used as regions of interest (ROI) for FW calculations. Bilateral structures were averaged and the hippocampal metrics were natural log transformed. Cognitive domains of working memory (Letter–number sequencing, Digit-span backward, Spatial-span backward) and episodic memory (HVLT delay, Logical memory (LM) delay, LM retention) were corrected for age and education. We defined MCI using the Jak and Bondi (2011) comprehensive criteria. Bivariate Pearson correlations were used for cognitive domains and ROI FW.

Results: Of 129 individuals, 20 met criteria for MCI and 109 were non-MCI. Groups did not differ in sex or race. MCI had significantly smaller hippocampal volume (p=.02) but not hippocampal FW (p = .390). Only hippocampal FW associated with episodic memory (r= -.450, p = .046) in MCI. There were no group differences in caudate nuclei volume or FW, and no cognitive associates to caudate nuclei volume or FW.

Conclusions: Only individuals meeting criteria for MCI showed a negative association between hippocampal FW and episodic memory. Findings provide new insights into the relationship of FW in the GM and memory. Increased FW in the GM might be a sensitive marker of early neuronal atrophy and cognitive decline. Future directions include exploring the utility of FW in predicting worsening of cognitive function in an MCI population.

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E. HESSEN. Based on brief assessment, amnestic MCI is associated with CSF biomarkers for AD in contrast to the prevailing NIA-AA MCI definition.

Objective: To find the brief neuropsychological screening criterion that best correlates with NIA-AA stage 2 (low CSF Aβ 42 concentrations and elevated tau) at baseline in persons seeking help for cognitive problems.

Participants and Methods: 452 consecutively recruited patients (age 40-80 years) from memory clinics in the Norwegian national multicentre longitudinal study Dementia Disease Initiation were included. CSF data as well as full data from brief cognitive screening was available for all patients.

Results: An amnestic variant of MCI, including at least one memory test below T-score 40, outperformed both the conventional NIA-AA MCI criterion and an MCI condition similar to the criterion suggested by Loewenstein et al. (2009), Jak et al. (2009) and Bondi et al. (2014). The amnestic variant was the only MCI criterion that significantly correlated with NIA-AA stage 2 in multivariate regression analysis.

Conclusions: The finding that amnestic MCI based on brief neuropsychological assessment is significantly associated to CSF biomarkers for AD is in accordance with longitudinal studies that find memory impairment; both in itself and especially in combination with other cognitive deficit to constitute a risk factor for subsequent cognitive decline and dementia. The prevalence of pathological biomarkers for AD is common in the elderly and the clinical significance of present findings depend on longitudinal validation.

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T. HILL-JARRETT, S. BOLLIN, B. HAMPSTEAD, A. BHAUMIK, L. MAY, F. HOPP & B. GIORDANI. Influence of Patient Insight on Mild Cognitive Impairment (MCI) Caregiver Burden.

Objective: Caregivers of MCI patients face unique challenges as they care for a person who is not fully functionally dependent but may lack insight into their cognitive deficits. The current study examined the effect of patient insight on caregiver burden for caregivers of persons with amnestic MCI.

Participants and Methods: Participants included caregivers of patients diagnosed with amnestic MCI (n = 75; Age M = 74.0 ± 9.28; MMSE M = 26.7 ± 3.02) and probable Alzheimer's disease (n = 75; Age M =74.6 ± 8.77; MMSE M = 20.3 ± 5.31) recruited through the Michigan Alzheimer's Disease Center and WSU Institute of Gerontology. A control group (n = 103; Age M = 68.7 ± 8.13; MMSE M = 29.2 ± 1.13) was included for comparison. Diagnosis was made via clinical consensus according to National Alzheimer's Coordinating Center's Uniform Data Set criteria. Patients were dichotomized (insight, no insight) by endorsement of memory decline versus memory stability/improvement. A MANOVA was conducted with patient group, insight, living arrangement, and driving status as independent variables and subscales of the Caregiver Burden Inventory as outcomes.

Results: A significant multivariate effect was found for the interaction between patient group, degree of insight, and living arrangement on the combined dependent variables, $F(5, 230) = 2.97$, p <.02; Wilks' Λ = .939; η^2 = .061. Follow-up ANOVAs revealed the interaction was specific to the Emotional Health subscale, $F(1, 260) = 5.88$, p <.02. Caregivers of MCI patients with poor insight trended toward worse emotional outcomes when they lived separately (M = 2.67, ± 4.62) compared to those living with the patient (M = 0.22 ± 0.44; p = .06). There was no difference in emotional status for caregivers of MCI patients with intact insight.

Conclusions: Patient insight into cognitive deficits plays a role in the emotional wellbeing of MCI caregivers and may be especially cumbersome to caregivers living separate from the patient.

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T. KARPOUZIAN-ROGERS, W.C. HEINDEL, B.R. OTT, G. TREMONT & E.K. FESTA. Phasic alerting and exogenous attentional orienting in aging and mild cognitive impairment.

Objective: Attentional systems include an exogenous spatial orienting network mediated by frontal and parietal cortical regions and cholinergic projections, and an alerting/arousal network mediated by the locus coeruleus-noradrenergic (LC-NA) system. While a prior study in young adults found that phasic alerting interacts with orienting through the selective enhancement of validly cued targets (Festa-Martino et al., 2003), little is known about the effects of healthy aging and mild cognitive impairment (MCI) on the relationship between phasic alerting and exogenous orienting.

Participants and Methods: Nineteen elderly controls (EC) and twenty amnestic MCI patients completed a color discrimination task, in which subjects selected the color of a target that appeared within one of two boxes. Exogenous orienting was manipulated by a brief thickening of the same (valid) or opposite (invalid) box in which the target subsequently appeared. Phasic alerting was manipulated by presenting an auditory burst of white noise simultaneously with the visual orienting cue on half of the trials. Additional trials assessed auditory alerting alone (sound without visual cues) or visual alerting alone (both boxes cued without sound). Reaction time (RT) on correct trials was measured.

Results: Both the EC and MCI groups displayed significant orienting and alerting effects as reflected in reduced RTs to valid and alerting cues, respectively. However, a significant three-way interaction emerged

such that phasic alerting selectively reduced RTs for validly cued but not invalidly cued targets in the EC group, though not in the MCI group.
Conclusions: Results from this study indicate that, similar to young adults, phasic alerting interacts with exogenous orienting in healthy elderly adults through the selective enhancement of the sensory processing of targets; however, this pattern was not observed in individuals with MCI. These findings may have implications for the role of the locus coeruleus in Alzheimer pathology.
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K. LANGER, D. O'SHEA, M. CHANDLER, D. LOCKE, J.A. FIELDS, V.S. PHATAK, P.M. DEAN & G. SMITH. Self-Efficacy Mediates the Association Between Physical Function and Perceived Quality of Life in Individuals with Mild Cognitive Impairment.
Objective: Previous research observed that individuals with mild cognitive impairment (MCI) ranked quality of life as the most important outcome, above and beyond cognitive function (Smith et al., 2018). There is consistent evidence supporting the negative impact of poor physical function on quality of life ratings. The present study examined whether individual differences in self-efficacy mediated the relationship between physical function and quality of life in persons with MCI.
Participants and Methods: Baseline data from 111 participants with MCI, excluding those with assistive walking devices, were obtained from a larger study assessing the effectiveness of behavioral interventions. Physical function was assessed by the Short Physical Performance Battery. Quality of life was assessed with the Quality of Life in Alzheimer's disease scale. Self-efficacy was assessed using a modified 9-item version of the Chronic Disease self-efficacy scales. Mediation analyses tested the hypothesis that self-efficacy would mediate the association between physical function and quality of life in individuals with MCI. All analyses were adjusted for age, education, cognitive severity, and sex.
Results: Self-efficacy was a significant mediator of the association between physical function and perceived quality of life (b=0.08, SE=0.03, LL CI =0.02, UL CI= 0.14) Individuals with better physical function had higher self-efficacy which was associated with higher quality of life ratings.
Conclusions: The current findings support prior evidence of a relationship between physical function and quality of life, as well as the consistently reported role of self-efficacy as a mediating factor. Interventions targeting self-efficacy may improve perceived quality of life, even in the presence of worsened physical function which is often observed in persons with MCI.
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L. LAU, M. BASSO, J. HOFFMEISTER, B. BOATWRIGHT, D. WHITESIDE & D. COMBS. Self-Generated Encoding and Practice Retrieval in MCI and Healthy Elderly.
Objective: Memory impairment occurs commonly in patients with mild cognitive impairment (MCI). Effective treatments of forgetfulness are wanting, but some investigations imply that robust encoding techniques may mitigate memory impairment. In particular, self-generated encoding (SG) and practice retrieval (PR) enhance learning in healthy individuals, but their impact upon patients with MCI is untested. Additionally, little research has directly compared the memory effects of these encoding strategies. Hence, this experiment evaluated the relative memory benefits of SG and PR encoding in a healthy group and patients with MCI.
Participants and Methods: Twenty one patients with MCI and 21 neurologically normal older adults were exposed to ten word pairs each according to SG and PR encoding conditions. Ten words were encoded according to each condition. Groups were equivalent in demographic characteristics. Memory for words was assessed with immediate and 20-minute delayed free recall and a recognition trial.
Results: Words remembered during immediate and delayed free recall were analyzed according to a 2 group X 2 encoding condition X 2 recall interval ANOVA, and words recognized were analyzed according to a 2 group X 2 encoding condition ANOVA. For free recall and recognition, SG yielded better recall than PR, and the healthy group remembered more words than the MCI group. Fewer words were remembered during delayed than immediate recall. The interaction of group and encoding condition was not significant.
Conclusions: SG resulted in better learning than PR, and the magnitude of this effect was equivalent between the healthy and MCI groups. Thus, SG may be more a more effective memory intervention strategy than PR for healthy elderly and those with MCI. These data imply that SG holds potential promise as a memory remediation technique for individuals with MCI.
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M.J. LEAVITT, N. KAPLAN, J.Z. K. CALDWELL & J. CUMMINGS. Longitudinal Sex Differences in the ADNI Rey Auditory Verbal Memory Test.
Objective: To assess how sex, diagnosis, and amyloid status (A+/A-) predict changes in Rey Auditory Verbal Memory Test (RAVLT) scores over two years, in individuals with normal cognition (CN) and mild cognitive impairment (MCI).
Participants and Methods: 534 CN and MCI participants (289 male, 245 female) in the Alzheimer's Disease Neuroimaging Initiative (ADNI2, ADNI-GO, and ADNI3) were examined. All had baseline florbetapir PET and screening visit neuropsychological testing. We calculated RAVLT immediate and delayed recall change scores (month 12 – screening, month 24 – screening). For the CN and MCI groups separately, we used regression models to examine the impact of sex on the ability of amyloid status to predict RAVLT immediate and delayed recall change scores, co-varying for age, education level, APOE-4 status, and the non-memory portion of the Montreal Cognitive Assessment (MoCA).
Results: The regression models for the CN group were not significant. For the MCI group, at 12 months, sex moderated the effect of amyloid status on changes in RAVLT immediate and delayed recall scores. Specifically, women with MCI showed similar changes in RAVLT immediate and delayed recall over time regardless of amyloid status, while A+ men with MCI showed more decline than A- men with MCI. At 24 months, A+ individuals with MCI showed more decline on the RAVLT than A- individuals regardless of sex.
Conclusions: Our study indicates that sex plays a role in moderating the effect that amyloid has on memory decline over time; however, our study only showed this effect for women with MCI and not those with CN, and only at 12 months after screening, not 24 months. This is partially consistent with the hypothesis that women have a cognitive reserve advantage in verbal memory over men. More research is necessary to fully characterize the effects of sex on trajectories of memory decline.
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M.E. MARTIN. Relevance of the Effect of Serial Position in the Differential Diagnosis of Mild Cognitive Impairment.
Objective: The effect of the serial position in the verbal learning has been extensively studied in the international literature. However, it has frequently been related to clinical aspects of Alzheimer's disease (AD) and not to the pathophysiological basis of the disease. The recent and growing use of AD biomarkers has made it possible to describe the physiopathology of cognitive changes. Our aim is to study the effect of serial position in patients with mild cognitive impairment (MCI) according to biomarker status.

Participants and Methods: 105 patients with MCI and 50 normal subjects were studied with biomarkers of AD (Amyloid in CSF or PET). Subjects were administered the Rey Verbal Learning Test (RAVLT) to study the effect of serial position on verbal learning trials and on delayed recall.
Results: As expected, subjects with MCI showed a deficit profile on total learning and delayed recall compared to normal controls. MCI patients were divided into two groups according to their biomarkers status (positive or negative). These groups showed significant differences on the primacy index of the first learning trial ($p < 0.005$) and on the end of list effect of delayed recall ($p < 0.05$).
Conclusions: These results demonstrate the clinical utility of specific RAVLT indexes to discriminate between patients with MCI with positive and negative biomarkers. Verbal memory measured by RAVLT is a good predictor of biomarker status in MCI.
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A. MEJIA, B. DEFEIS, M. CHANDLER, D. LOCKE, J.A. FIELDS, V.S. PHATAK, P.M. DEAN & G. SMITH. Psychometric Properties of a Self-Efficacy Scale in Mild Cognitive Impairment.
Objective: The purpose of this study was to investigate the psychometric properties of the Self-Efficacy Scale in Mild Cognitive Impairment (MCI). Internal consistency and test-retest reliability were analyzed in order to determine the scale as a valid and reliable outcome measure for its use in research.
Participants and Methods: This study is part of the Comparing Effectiveness of Behavioral Interventions to Prevent or Delay Dementia (CEBIPODD) in persons with MCI (pwMCI) intervention study. A modified version of the Chronic Disease Self-Efficacy Scales focused on self-reported confidence in managing memory-related activities, tasks, and emotional distress. The measure was given at five separate time points: baseline (prior to starting the intervention), intervention completion, and at 6, 12, and 18-month follow up. There were 228 pwMCI who completed the measure at baseline and 173 pwMCI at 18-month follow up.
Results: Internal consistency (coefficient alpha) was high for each time point and varied from .925 to .944. Pearson correlation of total scores was significant across each of the five time points and ranged from .563 to .703. Paired-sample tests using total scores of each time point consequently determined test-retest reliability. Self-efficacy was highest at intervention completion ($p < .001$) and lowest at 18-month follow up ($p < .05$). Self-efficacy scores were not significantly different at baseline and at 6 and 12-month follow up.
Conclusions: Changes in self-efficacy across time points may have resulted from sense of confidence felt immediately after completing the intervention program, as well as the possible decline in self-efficacy as memory difficulties progress over time in pwMCI. However, overall results demonstrated the scale as being a reliable and valid measure of self-efficacy in pwMCI, and perhaps sensitive to intervention changes. Future research will investigate predictors of self-efficacy score changes in this population.
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A. MILLER & K. KRISHNAN. An Investigation of False Positives on the Montreal Cognitive Assessment.
Objective: The Montreal Cognitive Assessment (MoCA) is a 30-point cognitive screening measure found to be sensitive in detecting mild cognitive impairment. Work by Rossetti and colleagues (2011) demonstrates that the established cutoff of < 26 might not be appropriate for all populations, in part due to a high failure rate for certain test items (i.e., cube drawing, delayed free recall, sentence repetition, placement of clock hands, abstraction items, verbal fluency). The present study aimed to investigate cases of false positives on the MoCA in a memory clinic.
Participants and Methods: The MoCA was administered to 1,632 patients evaluated at a memory disorders clinic as part of their routine clinical care. Thirteen patients (54% male; 92% Caucasian; age: $M = 64.5$ years, $SD = 10.4$ years) were identified who scored 25 or below on the MoCA and were ultimately determined to be cognitively intact upon further neurological work up by dementia specialists, including neuropsychological evaluation in 12/13 patients.
Results: Average MoCA score was 23.8 ($SD = 2.0$, Range = 18-25). All participants were native English speakers with at least a high school education ($M = 14.8$, $SD = 1.8$, Range = 12-18). Participants frequently lost points on the visuospatial/executive, delayed recall, abstraction, and language domains. Upon further investigation, common medical history among the participants included emotional distress (n = 9), insomnia and/or fatigue (n = 6), chronic headache and/or migraine pain (n = 4), sleep apnea (n = 4), and chronic pain (n = 3).
Conclusions: These results indicate that older adults who present with medical comorbidities or psychological factors as noted above may have a propensity to score below the established cutoff of 26 on the MoCA and thus be misclassified as cognitively impaired solely based on the MoCA. With increasing use of the MoCA in clinical practice, this finding highlights the importance of a thorough medical review and more comprehensive testing before diagnosis in patients with similar presentations.
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T. NIKOLAI, H. MARKOVÁ, A. FENDRYCH MAZANCOVÁ, K. ČECHOVÁ, V. MATUŠKOVÁ & M. VYHNÁLEK. The Prevalence of Low Scores in the Neuropsychological Battery of Czech Brain Aging Study, the Differences Between Cognitively Healthy Adults, Subjective Cognitive Decline and Mild Cognitive Impairment due to Alzheimer's Disease.
Objective: The identification of neuropsychological impairment often involves administration and interpretation of several tests that are designed to evaluate different components of cognitive functioning. However, when interpreting multiple measures of the tests, clinicians know that a certain proportion of subjects will invariably perform some low scores. This study presents the prevalence of low scores in the Neuropsychological Battery of Czech Brain Aging Study (NB-CBAS) in cognitively healthy adults (HA) and two clinical groups: participants with Subjective Cognitive Decline (SCD) and Mild Cognitive Impairment due to Alzheimer's Disease (AD-MCI).
Participants and Methods: We examined 50 HA, 61 SCD, and 60 AD-MCI. All subjects were recruited at the Memory Disorder Clinic at Motol University Hospital in Prague. The exploratory data analysis of the prevalence of low scores focused on 15 main test scores of NB-CBAS. Results were presented in T-scores for different age and education groups. T-scores with the mean value of 50 and the standard deviation of 10 were based on rank scores of original data, i.e. they were calculated non-parametrically. The base rates of low scores were calculated for four cutoffs (-0.5 SD, -1 SD, -1.5 SD, -2 SD).
Results: There were substantial differences between age and education groups in HA, SCD, and AD-MCI in case of all cut-offs. With the increasing age, the effect of the education slightly decreased. When all 15 test scores of NB-CBAS battery were considered simultaneously, AD-MCI had the highest percentage of low scores in all cut-offs. SCD and HA differed only in the cut-off -0.5SD, SCD had a higher percentage of low scores than HA.
Conclusions: We confirm a fair prevalence of low scores in all groups. The prevalence increases with higher age and lower education, the highest prevalence of low scores were in AD-MCI group, and SCD differ from HA only in the cut-off -0.5SD. It seems that the prevalence of low scores could be understood as the early sign of cognitive diminishment in SCD.

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S.L. NORMAN, C. SUMIDA, A. WEAKLEY, R. FELLOWS & M. SCHMITTER-EDGECOMBE. The Effect of Medication Regimen Complexity on Medication Management Across Different Groups at Risk for Nonadherence.

Objective: The effect of medication regimen complexity on medication management has not been explored in populations at risk for nonadherence. The present study examined whether medication regimen complexity influenced performance on a medication management assessment while controlling for cognition and age in healthy older adults (HOA) and two groups at risk for nonadherence (e.g., mild cognitive impairment, MCI).

Participants and Methods: The Medication Management Abilities Assessment (MMAA) and personal medication regimen information were collected from HOAs (N = 166, M_{age} = 68.2, SD_{age}= 8.9, M_{edu} = 16.5, SD_{edu}= 2.5), older adults with MCI (N = 37, M_{age} = 69.0, SD_{age}= 8.6, M_{edu} = 16.0, SD_{edu}= 2.8), and older individuals with multiple complex medical conditions (MCMC, N = 48, M_{age} = 61.5, SD_{age}= 7.2, M_{edu} = 16.2, SD_{edu}= 3.0). A medication regimen complexity index (MRCI; Libby, 2013), which included number of medications, dose frequency and rules (e.g., take with food), was calculated from participants self-reported medication information and medical records. Participants also completed neuropsychological tests of processing speed, working memory, executive functioning and memory.

Results: Separate negative binomial regression analyses were performed for each group to examine the effect of MRCI on MMAA, while controlling for age and cognitive variables. MRCI did not significantly predict medication management performance in any of the regressions. However, while controlling for MRCI, age, and the other cognitive variables, processing speed and memory significantly predicted MMAA performance in the MCI group. Processing speed and executive functioning significantly predicted MMAA performance for the MCMC group.

Conclusions: In summary, cognitive ability (particularly memory, processing speed, and executive functioning) but not MRCI predicted MMAA performance in the MCI and MCMC groups. Together, these findings suggest that cognitive status and not personal medication regimen complexity influences performance on the MMAA.

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X.A. ORTIZ, F. GÓNGORA, C. MADRID & A.A. ESCALERA. Amnestic Mild Cognitive Impairment: A 5-year Follow-Up Study.

Objective: To analyze the neuropsychological performance of patients with amnestic mild cognitive impairment for 5 years.

Participants and Methods: The sample was obtained from a population of 3,000 pensioners, 185 subjects (mean age 70.30±6.12), 112 women and 73 men with no neurologic or psychiatric disorders were included. Neuropsychological evaluation includes: orientation, verbal memory, visuoespatial memory, language, motor and executive functions. A 5-years follow-up study was designed and patients with Amnestic MCI were evaluated in three moments: baseline, at 3 years and at 5 years.

Results: Subjects were classified as healthy or as with MCI according to the following criterion: clinical and psychometric. Based on the psychometric criterion 82.71% were healthy, 17.29% (n=32) had MCI and 10.27% (n=19) had amnestic MCI. Of the 19 patients, only 14 completed the 5 years of follow-up. All the cognitive domains were analyzed: orientation, verbal memory, visuospatial memory, language, motor and executive functions. The results showed significant differences between the basal evaluation and the second and third evaluation in intrusions during the verbal evocation of memory (H (2) = 11.18, p <.004), phonological intrusions during the execution of phonological verbal fluency (H (2) = 7.79, p <.02) and intrusions semantics in verbal semantic fluency (H (2) = 6.31, p <.04).

Conclusions: The qualitative analysis of the performance of patients in the initial evaluation is essential to differentiate normal aging from mild cognitive impairment, as well as to offer them non-pharmacological treatments such as cognitive stimulation in order to slow down the deterioration.

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T.S. PATERSON, B. SIVAJOHAN, K. STOKES, M. FREEDMAN, B. LEVINE & A.K. TROYER. Cogniciti's Brain Health Assessment: Validation in Amnestic Mild Cognitive Impairment.

Objective: As the population ages, there is an increasing need for easily administered assessments sensitive to mild cognitive difficulties. This study examined the ability of Cogniciti's Brain Health Assessment, a publicly available, self-administered, online measure, to detect amnestic mild cognitive impairment (aMCI) in community dwelling older adults.

Participants and Methods: Forty-eight adults aged 60-89 were recruited from Baycrest Health Sciences Centre, and underwent a neuropsychological assessment (gold standard) to determine diagnosis of normal cognition (NC) or aMCI (by consensus of 3 staff neuropsychologists). Participants also completed the Cogniciti assessment online. Logistic regression and ROC analyses were used to examine the utility of this measure.

Results: Thirty participants were diagnosed with aMCI and 18 with NC, with no age, gender, or education differences between groups. Standardized average scores of the four Cogniciti subtests predicted aMCI with a sensitivity and specificity (with 95% CI's) of .83 [.65-.94] and .72 [.46-.89], respectively, with PPV and NPV of .83 [.65-.94] and .72 [.46-.89], respectively. The four Cogniciti subtest scores were also entered into a logistic regression model, which provided improved accuracy, with sensitivity and specificity of .97 [.81-1.00] and .83 [.58-.96], respectively, and PPV and NPV of .91 [.74-.98] and .94 [.68-1.00], respectively.

Conclusions: The overall accuracy of the Cogniciti online, self-administered, assessment against the gold standard in our sample was 79% (AUC =.813) using average subtest performance, with improvement to 92% accuracy in classification using a logistic regression model. These preliminary results support the validity of the Cogniciti Brain Health Assessment as a cost- and time-efficient tool of potential use in streamlining pre-assessment for aMCI by medical practitioners.

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S. PUDUMJEE, D. LOCKE, M. CHANDLER, V.S. PHATAK, J.A. FIELDS, P.M. DEAN & G. SMITH. Reliable Change on the Quality of Life-AD Scale in a Multicomponent Behavioral Intervention.

Objective: The Quality of Life in Alzheimer's disease (QOL-AD) questionnaire is a 13-item measure currently used in both research and clinical settings to assess general well-being. The QOL-AD is often repeatedly administered to track change but error variance due to individual differences, state variables, and measurement error remains unaccounted for. This study examines Reliable Change Indices (RCI) for the QOL-AD to facilitate a more nuanced interpretation of the changes over time.

Participants and Methods: 175 individuals diagnosed with mild cognitive impairment, participating in a larger study assessing the effectiveness of behavioral interventions, responded to the QOL-AD at baseline, immediately after the intervention was carried out, and at 6, 12, and 18 month follow-up. Reliable change estimates were calculated accounting for standard error of measurement while using a 90% prediction interval.

Results: Overall, a 6-point change from the baseline assessment to each of the post intervention assessments was found to be sufficient and represented reliable change. Twenty-two individuals demonstrated reliable change immediately following the intervention, and 17, 13, and 11 individuals at 6, 12, and 18 month follow-up, respectively, showed such an improvement. Conversely, 5 individuals at session end, and 15, 12, and 13 individuals at each of the respective follow-up assessments showed a decline in excess of 6 points.
Conclusions: When evaluating the effectiveness of an intervention, group differences often over-shadow within-subject differences. Consideration of reliable change indices permits identification of treatment responders and, consequently, variables that best predict a response to treatment. The frequency of opposite trends in improvement and decline could be due to the behavioral interventions being implemented. Further stratified analysis will help tease apart these effects.
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K.REITER,A.N.CORRERO,S.FRANCZAK,E.ULMER,D.SABSEVITZ & L. GLASS UMFLEET. Patterns of neuropsychological performances based on memory profiles in MCI.
Objective: Alzheimer's disease (AD), vascular dementia, and other causes of neurocognitive disorders are associated with distinct memory patterns. The goal of this study was to assess neuropsychological task performance by memory profile.
Participants and Methods: Forty-seven participants underwent neuropsychological evaluation and were diagnosed with mild neurocognitive disorder. Memory profiles from the HVLT-R included 3 groups: Normal memory (NM; N=17), retrieval weakness (RW; N=13), and storage weakness (SW; N=17). NM had scaled scores (ss) >7 for immediate recall (IR), delayed recall (DR), and recognition (RC). RW had IR ss >7 and DR >1 standard deviation (SD) below IR; RC was similar to IR. SW DR was <1 SD below IR and RC < IR. rinciple components analysis (PCA) with varimax rotation of ss for tasks of memory, language, visuospatial abilities, and executive functions was conducted.
Results: NM PCA produced 4 components (C): C1 explained (exp) 42% of variance (VAR) with high loadings on story and design memory, processing speed, and cognitive flexibility. C2 exp 27% of VAR with high loadings on visual memory, verbal abstraction, remote memory, and verbal fluency. RW PCA produced 6 C; C1 exp 31.5% of VAR with high loadings on deductive reasoning, cognitive flexibility, processing speed, and delayed verbal recall. C2 exp 42% of VAR with high loadings on picture naming, verbal abstraction, processing speed, and list learning. SW PCA produced 5 C: C1 exp 28.9% of VAR with high loadings on remote memory, visual memory, and psychomotor speed. C2 exp 23% of VAR with high loadings on verbal and visual learning, story recall, and letter fluency.
Conclusions: Results revealed that SW and RW PCAs produced less explained variance relative to NM with different patterns of performances within each memory group. NM had high correlations on tasks of memory and executive functioning (EF), whereas EF tasks explained much of the variance in RW. Finally, SW C1 was more heterogeneous than the other groups and included remote memory.
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E. ULMER, K. REITER, A.N. CORRERO, S. FRANCZAK, D. SABSEVITZ & L. GLASS UMFLEET. Quantitative neuroimaging as a potential biomarker for amnestic MCI.
Objective: Structural neuroimaging and volumetrics are a known biomarker for decline in aging and disease progression in memory disorders. In particular, single domain amnestic mild cognitive impairment (saMCI) is associated with hippocampal atrophy while more diffuse cortical atrophy is thought to be associated with multi-domain amnestic mild cognitive impairment (maMCI) in addition to hippocampal atrophy. The goal of this study is to investigate the structural relationships between hippocampal and cortical volume loss in distinguishing saMCI and maMCI using standardized quantitative MRI methods.
Participants and Methods: Twenty-nine individuals were diagnosed with saMCI (n=10) or maMCI (n=19) based on neuropsychological testing. All participants underwent a brain MRI with NeuroReader, an FDA approved software program that provides z-scores for 45 brain regions relative to same-age healthy controls. Paired t-tests were conducted to assess the relationship of the hippocampus with other cortical regions within each group.
Results: Results of the paired t-tests revealed a significant mean z-score difference between the hippocampus and frontal lobe bilaterally in the saMCI but not maMCI group (Left Hemisphere $t(9)$= -2.530, p<.05; Right Hemisphere $t(9)$= -2.321, p<.05), indicating lower z-scores for the hippocampus than the frontal lobe. Within maMCI, z-scores were significantly different between the left hippocampus and temporal lobe that was not observed in the saMCI group, $t(18)$=2.595, p<.05, indicating lower z-scores in the temporal lobe.
Conclusions: The current study revealed different cortical atrophy patterns in saMCI and maMCI, consistent with the pattern of cognitive impairment. This study highlights the utility of NeuroReader as a potential biomarker for MND with clinical utility to aid in differential diagnosis and treatment planning.
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S. FRANCZAK, K. REITER, A.N. CORRERO, E. ULMER & L. GLASS UMFLEET. A comparison of Amnestic MCI and Non-Amnestic MCI using quantitative neuroimaging software (Neuroreader).
Objective: Amnestic mild cognitive impairment (aMCI) and non-amnestic mild cognitive impairment (naMCI) are presumed to be distinct neurobehavioral syndromes with different pathologies, though few studies compare the structural brain differences. The purpose of this study is to compare quantitative volumetric data for aMCI to naMCI suggestive of frontosubcortical dysfunction.
Participants and Methods: Twenty-eight patients with MCI underwent MR Neuroreader and neuropsychological testing. The latter was used to diagnose MCI and its subtypes. Neuroreader is an FDA-cleared software program that carries out automated segmentation of 45 brain structures compared to a normative group of healthy controls. Included in Table 1 are demographic variables for MCI groups. Comparisons between aMCI and naMCI-frontosubcortical with mean NeuroReader z-scores per region are displayed in Table 2. Displayed in Table 3 are results of the one-sample t-test to compare MCI groups to a z-score of 0.
Results: Results of independent t-tests did not reveal group differences on Neuroreader volumes (all p > .05) for brain regions including hippocampus, amygdala, frontal lobe, and subcortical structures. One-sample t-tests revealed that the mean z-score of the hippocampus and amygdala in aMCI was significantly different from 0. In the naMCI-frontosubcortical group, the amygdala was nonsignificant, but hippocampal volumes were significantly lower than 0. There were several other volumes that differed from 0 in both groups displayed in Table 3.
Conclusions: Results showed no significant group differences between aMCI and naMCI on volumetric data; however, several regions within both MCI groups were lower relative to Neuroreader controls. It is possible that the lack of expected differences is due to inclusion of multi-domain MCI in both groups. It is also possible that there is unknown disease overlap between groups, and future research should explore the conversion to Alzheimer's Disease/other etiologies in these groups using longitudinal data.
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D. RÉMILLARD-PELCHAT, S. RAHAYEL, R.B. POSTUMA, J. MONTPLAISIR, M. GAUBERT, P. BOURGOUIN, J. CARRIER, O. MONCHI & J. GAGNON. Neuroanatomical Alterations Underlying Mild Cognitive Impairment in REM Sleep Behavior Disorder.

Objective: Rapid eye movement sleep behavior disorder (RBD) is a sleep condition considered as a major risk factor for Parkinson's disease and dementia with Lewy bodies. We aimed to investigate the neuroanatomical alterations underlying mild cognitive impairment (MCI) in patients with RBD.

Participants and Methods: Fifty-three patients with RBD, including 17 patients with MCI, were recruited and compared to 41 healthy controls. All participants underwent extensive clinical assessments, cognitive testing, and 3-tesla MRI acquisition of T1 anatomical images. Voxel-based morphometry and deformation-based morphometry were performed to investigate brain volume abnormalities between groups. Correlations were performed to investigate associations between MRI metrics and cognitive domains (attention and executive functions, verbal learning and memory, and visuospatial abilities).

Results: Patients with MCI had reduced volume throughout the cortex, particularly in the insula and temporal lobes. Volume abnormalities were also found in several subcortical structures including the putamen, amygdala, hippocampus, and cerebellum. Volume contraction in the midbrain was correlated with lower performance in attention and executive functions. Patients without MCI had a less severe pattern of atrophy, which nonetheless included the frontal and insular lobes and the cerebellum.

Conclusions: Cortical and subcortical volume reductions were associated with cognitive status in patients with RBD, with more extensive abnormalities in patients with MCI. Our results are in line with the brain structural alterations reported in dementia with Lewy bodies and Parkinson's disease with dementia. Our study highlights the importance of distinguishing between subgroups of RBD patients to better understand the underlying neurodegenerative processes.

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E. RHODES & T. GIOVANNETTI. Grit and Cognitive Functioning in Healthy Aging and Mild Cognitive Impairment.

Objective: Grit is a noncognitive trait related to perseverance and consistent pursuit of long-term goals. Research on grit and aging provides evidence that grit increases with age and may be protective of cognitive and everyday functioning. However, no studies to date have examined relations between concurrently measured grit, cognitive abilities, and everyday functioning. This study tested two hypotheses: 1) that grit would predict cognitive performance and that this relation would be moderated by clinical diagnosis of cognitive status (i.e., healthy vs. mild cognitive impairment; MCI), and 2) that grit would predict everyday functioning and that this effect would be mediated by compensatory strategy use.

Participants and Methods: Sixty-one older adults were recruited from the Penn Memory Center's National Alzheimer's Coordinating Center (NACC) cohort, including forty healthy controls with normal cognition and twenty-one individuals with mild cognitive impairment (MCI). Participants completed tests of verbal episodic memory, executive functioning, grit, compensatory strategy use, and everyday functioning.

Results: Grit was not associated with cognitive functioning in either domain. Instead, memory performance was predicted only by clinical status (healthy vs. MCI), and executive functioning was predicted by clinical status, depressive symptoms, and years of education. Grit was negatively associated with everyday functional difficulties; however, there was no indirect effect of compensatory strategy use. Additionally, grit was moderately correlated with depression symptoms (r = -0.41).

Conclusions: Grit is predictive of preserved everyday functioning, but not cognitive functioning, in a sample of healthy older adults and individuals with MCI. Mechanisms explaining the role of grit on everyday function remain elusive, though secondary analyses support that grit also influences affective well-being and may have a weaker role in the context of cognitive impairment.

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J. RICE, F. SPROUL & C. CARNEY. Fundamental Attribution Error in the Diagnosis of Early-Stage Alzheimer's Disease Versus Mild Cognitive Impairment.

Objective: Literature suggests that older adults are often stereotyped by clinicians and given worse prognoses in comparison to their younger counterparts. Additionally, there is little research on the influence of caregivers in the clinician's diagnosis of geriatric clients. This study assesses if the disposition of the client and family evoke clinician fundamental attribution error (FAE) in the diagnosis of early-stage Alzheimer's disease (ESA) versus mild cognitive impairment (MCI).

Participants and Methods: Licensed mental health clinicians (N=89) completed a questionnaire detailing their diagnostic impressions, and influence of dispositional factors, after reading a vignette detailing a geriatric patient with unspecified cognitive difficulties.

Results: Susceptibility to committing an FAE was present, as participants rated the client's diagnosis as more severe when the client was resistant, than when they were receptive. Dependent on diagnostic group, participants also rated the client more severely if the client was resistant and the family was uncooperative.

Conclusions: These findings suggest a need for awareness and improved training regarding clinician bias in the geriatric population.

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G.D. SANTORELLI & G. TREMONT. Differential Patterns of Subjective Cognitive Complaints and Contributions of Depression in aMCI and Cognitively Intact Clinic Patients.

Objective: Subjective cognitive complaints (SCC) aid in the diagnosis of mild cognitive impairment (MCI). However, SCC are often not representative of cognitive functioning in cognitively-intact memory clinic (CI) patients, and may be underreported in individuals with MCI due to impaired insight. Research on the types of SCC endorsed by cognitively-intact and impaired individuals is mixed, and many studies do not consider how individual factors contribute to SCC. The goal of this study was to determine differences in SCC endorsed by CI and amnestic MCI (aMCI) patients on a self-report scale. We also examined associations between depressive symptoms, dementia family history, and SCC.

Participants and Methods: Participants underwent a neuropsychological evaluation and were determined to be either CI (n=40) or aMCI (n=46). They also completed the Cognitive Difficulties Scale (CDS) and the Beck Depression Inventory-II (BDI-II).

Results: CI patients reported greater overall cognitive difficulties than aMCI patients (p=.01, d=0.57). Items related to praxis (CDS Factor 2; p=.01, d=0.57) and orientation for persons (CDS Factor 4; p=.01, d=0.59) were rated higher in CI than aMCI patients. A greater percentage of CI versus aMCI patients endorsed two items related to language (e.g., "I don't say quite what I mean"; ps<.05), two related to attention ("I can't keep my mind on one thing"; ps<.05), and one related to retrospective memory ("I forget steps in recipes I know well"; p<.01). Depressive symptoms were associated with CDS ratings in both groups (CI: r=.76, p<001; aMCI: r=.70, p<.001). CDS ratings did not significantly differ between those with or without a family history of dementia.

Conclusions: Results indicate that patterns of SCC differ between CI and aMCI patients; while both groups endorsed memory difficulties, CI patients were more likely to endorse problems across cognitive domains. Findings suggest that clinicians should consider the *pattern* of SCC reported and contributions of mood in the diagnosis of MCI.

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B. SIVAJOHAN, T.S. PATERSON, K. STOKES, M. FREEDMAN, B. LEVINE & A.K. TROYER. Cogniciti's Brain Health Assessment and the MoCA: A Comparison of Screening Measures for Diagnosis of aMCI.

Objective: Routine cognitive screening is imperative in a rapidly ageing population and this presents an immediate need for easily administered assessment tools that are sensitive and specific for detection of mild cognitive changes. This study compares the ability of Cogniciti's Brain Health Assessment (a publicly accessible, self-administered, online measure) to the Montreal Cognitive Assessment (MoCA), to detect amnestic mild cognitive impairment (aMCI) in community dwelling older adults.

Participants and Methods: Forty-eight individuals (age 60-89) were recruited from Baycrest Health Sciences Centre, and completed a neuropsychological assessment to establish diagnosis of normal cognition (NC) or aMCI (by consensus of 3 study neuropsychologists). They then completed the Cogniciti assessment and MoCA, and sensitivity and specificity of these measures to diagnose aMCI was compared.

Results: No age, gender, or education differences were observed between groups (aMCI: *N*=30; NC: *N*=18). Sensitivity and specificity of the Cogniciti assessment were .97 and .83 (PPV & NPV of .91 & .94), using a logistic regression model to weight Cogniciti subscore performance. By contrast, a logistic regression model of MoCA subscores indicated sensitivity and specificity of .83 and .72, respectively (PPV & NPV of .83 & .72). Notably, sensitivity and specificity for MoCA total scores were .90 and .50, respectively (PPV & NPV of .75 & .75).

Conclusions: The overall accuracy of the Cogniciti assessment to classify aMCI vs. normal cognition in our sample was 92% (AUC=.813; mean score performance), whereas overall accuracy of the MoCA was 77% (AUC=.741 for MoCA total score). The Cogniciti Brain Health Assessment can improve resource utilization by identifying aMCI with increased sensitivity and specificity compared to the MoCA. This easily administered assessment may thus improve on pre-assessment of aMCI as currently conducted by medical practitioners.

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E.E. SUNDERMANN, K. THOMAS, K.J. BANGEN, A.J. WEIGAND, J.S. EPPIG, E.C. EDMONDS, C.G. WONG, M. BONDI & L. DELANO-WOOD. Sex Effects of Prediabetes on Cognition and Brain Metabolism Using FDG PET: An Alzheimer's Disease Neuroimaging Initiative Study.

Objective: Although diabetes is a well-known risk factor for Alzheimer's disease (AD), little is known about how its precursor—prediabetes—impacts neuropsychological function and brain health. Thus, we examined the relationship between prediabetes and AD-related biologic and cognitive markers in a well-characterized sample from the Alzheimer's Disease Neuroimaging Initiative. Additionally, since diabetic women show higher rates of AD and more atherogenic lipid profiles than diabetic men, we examined whether sex moderates any observed associations.

Participants and Methods: The sample included 392 nondemented prediabetic (fasting blood glucose: 110-125 mg/dL) and 523 normoglycemic individuals (age range: 55-91). Linear mixed effects models, adjusting for demographics and vascular and AD risk factors, examined the independent and interactive effects of prediabetes and sex on 2-3 year trajectories of brain glucose metabolism (FDG PET), hippocampal/intracranial volume ratio (HpVR;), cerebrospinal fluid p-tau/Aβ, and cognition (executive function [EF], language and memory). Analyses were repeated in a subsample with mild cognitive impairment (MCI: n=520).

Results: In the total sample, prediabetes predicted greater brain hypometabolism across time. Within MCI, a Prediabetes x Sex x Time interaction revealed greater language decline over time in prediabetic women versus all other groups. Within MCI, Prediabetes x Sex interactions showed that prediabetic women exhibited poorer EF and hypometabolism relative to normoglycemic women across time, whereas there were no adverse effects of prediabetes in men. Prediabetes did not relate to HpVR, p-tau/Aβ, or memory.

Conclusions: Across the sample, prediabetes was associated with brain hypometabolism. In MCI women only, prediabetes predicted brain hypometabolism and poorer EF and faster declines in language across time. Results suggest that prediabetes may affect cognition through altered brain metabolism, and that women may be more vulnerable to the negative effects of glucose intolerance.

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K.M. WALL, J. STARK, A. SCHILLACI, M. VANBRAKLE, M. MICHEL, M. MALONEY, N. BARCELOS, B. COHEN, P. ARCIERO & C. ANDERSON-HANLEY. Cognitive Impairment Corresponds with a Lower Body Mass Index (BMI): A Cross-Sectional Analysis of Older Adults with Mild Cognitive Impairment (MCI) and Caregivers.

Objective: Dementia rates have risen to 5.5 million in the USA and are expected to triple by 2050 (Alzheimer's Association, 2017). The costs of cognitive decline are profound and thus preventative measures are highly sought. It is necessary to understand the factors that affect cognitive decline to develop preventative measures. This study examined correlates of baseline cognitive status of older adults who enrolled in an exergamingintervention (interactive Physical and Cognitive Exercise Study; iPACES).

Participants and Methods: The study enrolled 45 older adults with an average age of 73.6 (*SD*=11.6). Co-residing pairs, especially MCI-caregiver pairs, were sought to participate in a 3-month pilot trial (iPACESv1.0; Anderson-Hanley et al., in press or iPACESv2.0; clinical trial #NCT03069391). A neuropsychological battery including the Montreal Cognitive Assessment (MoCA) (overall cognitive function) and Alzheimer's Disease Assessment Scale Wordlist (verbal memory) was administered. Baseline demographics and additional related factors (self-reported physical activity; SRPA, and body mass index; BMI) were collected.

Results: MoCA scores correlated significantly with BMI, controlling for age, education, and sex (r=.42, p=.048; n=24). Verbal memory was not significantly related to BMI. Neither cognitive variable was related to SRPA.

Conclusions: The results suggest that lower BMI relates to diminished cognition; consistent with prior research (Cronk et al., 2010; Johnson et al., 2006). It is unclear if general weight loss represents an outward sign of systemic changes (ex. neuronal structure and function). It has also been asserted that subtle cognitive changes may lead to decreased nutritional input or mood changes altering appetite. Further research is needed to clarify when and how factors such as BMI play a role in cognition. The findings contrast prior reports of the opposite relationship between BMI and cognition (Walther et al., 2009), but it may be that the relationship becomes inverse is among the oldest-old.

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R. BINACO, N. CALZARETTO, J. EPIFANO, S. MCGUIRE, M. UMER, S. EMRANI, V.J. WASSERMAN, D.J. LIBON & R. POLIKAR. Machine Learning Analysis of the Clock Drawing Test (dCDT) for Differential Diagnosis Between Mild Cognitive Impairment Subtypes and Alzheimer's Disease.

Objective: This research studied patients diagnosed with non-mild cognitive impairment (MCI), amnestic MCI (aMCI), combined mixed/dysexecutive MCI (mx/dys MCI), and AD applying machine learning algorithms using digital Clock Drawing Test (dCDT) variables to classify patients into their respective groups.

Participants and Methods: Participants (n=163) were patients diagnosed with AD (n=59), non-MCI (n=35), aMCI (n=26) and combined mx/dys MCI (n=43). The digital Clock Drawing Test (dCDT) uses a digital pen, smart paper, and specific software to record patient's drawings. Standard clock drawing command and copy procedures were used i.e., "draw the face of a clock, put in all of the numbers, and set the hands for 10 after 11." 350 combined command/copy features were extracted; analyzed with three feature selection approaches (wrapper, embedded, filter) to determine most relevant features; then used to train classification models (support vector machine, random forest, multilayer neural network) to determine the best classifiers.

Results: Neural network performed best as a classifier regarding all types of feature selection. Of the three feature selection algorithms, the embedded (elastic net) approach achieved the best binary classification results with 10-fold cross validation accuracies at or above 84%, e.g., AD vs. non-MCI=91.42%; AD vs. aMCI=91.49%; AD vs. mx/dys MCI=84.05%; aMCI vs. mx/dys MCI=84.11%, aMCI vs. non-MCI=83.44%, and mx/dys MCI vs. non-MCI=85.42%. For all binary classification cases, 25-125 combined command and copy dCDT features were used. Three and four class analyses have not yet yielded acceptable levels of classification.

Conclusions: Differential diagnosis between MCI subtypes and non-MCI patients will be increasingly important as disease modifying agents become available. The application of machine learning to standard neuropsychological test may provide an effective first line screening method to track neurocognitive status and early detection of MCI subtypes.

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T.A. WEBBER, J. MARCEAUX, E. CRITCHFIELD & J. SOBLE. Characterizing Verbal Learning Acquisition in Mild and Major Neurocognitive Disorder using Latent Growth Modeling.

Objective: Objective: California Verbal Learning Test-Second Edition (CVLT-II) provides a learning slope index that may be useful in differentiating cognitively unimpaired from impaired examinees. While recent efforts using latent growth modeling have identified more sophisticated verbal learning acquisition indices that differentiate dementia from normal cognition, existing research has not tested whether these indices differentiate mild cognitive impairment (MCI) from dementia or normal cognition.

Participants and Methods: Participants and Methods: A clinically-referred sample of 197 veterans completed the CVLT-II during a more extensive neuropsychological evaluation. A series of latent growth models specifying linear and quadratic growth (including and excluding demographic variables) were fit to raw scores for the five CVLT-II learning trials for examinees without a neurocognitive disorder diagnosis (N = 133), with mild neurocognitive disorder (i.e., MCI; N = 50), and with major neurocognitive disorder (i.e., dementia; N = 14).

Results: Results: A quadratic growth model including demographic covariates (sex, age, race, education, and language) best fit the data (CFI = .986; RMSEA = .058). Increasing severity of neurocognitive disorder diagnosis was associated with reduced initial learning and reduced rate of learning acquisition, but not rate of deceleration in learning acquisition. MCI was negatively associated with initial learning, but not rate of learning or deceleration.

Conclusions: Conclusions: Verbal learning acquisition was best characterized by a quadratic growth model. While increasing severity of neurocognitive disorder was associated with reduced initial learning and rate of learning acquisition, rate of learning acquisition in MCI was indistinguishable from cognitively unimpaired examinees. These results suggest that identification of reduced initial verbal learning, but not rate of verbal learning acquisition or rate of deceleration in learning acquisition, may supplement diagnosis of MCI.

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C.G. WONG, K.R. THOMAS, S. COOPER, S. DEVINE, L. DELANO-WOOD, D.J. LIBON, A. JAK, R. AU & M. BONDI. Comparison of Jak/Bondi Neuropsychological Criteria for MCI: Effect of Number of Tests.

Objective: The Jak/Bondi actuarial neuropsychological criteria have shown improvements over conventional mild cognitive impairment (MCI) diagnostic approaches; however, the effect of different numbers of tests and domains considered in the criteria has not been examined. We therefore compared a 6- and 12-test version of the Jak/Bondi criteria on diagnostic rates and ability to predict of progression to dementia.

Participants and Methods: 314 older adults (ages 79-96) from the Framingham Heart Study were classified as cognitively normal (CN) or MCI via two versions of the Jak/Bondi criteria (>1 SD below normative means on 2 scores within a cognitive domain). The 6-test version included 2 tests in 3 domains (memory, language, executive), and the 12-test version included 2-3 tests in 5 domains (as above plus attention, visuospatial). A subset of the sample (n=235) had 5-year follow-up.

Results: The 12-test version classified a significantly larger proportion of participants as MCI (31.5%) compared to the 6-test version (22.3%), χ^2=15.46, p<.001. Both versions had high specificity (92.3%) for identifying individuals who remained CN; however, the 6-test version (34.4%) had relatively higher sensitivity than the 12-test version (20.3%). Cox models showed that 6-test MCI participants had 3.3-times and 12-test MCI participants had 2.7-times the risk of progressing to dementia compared to CN participants.

Conclusions: Increasing the number of tests considered in the Jak/Bondi criteria resulted in a higher MCI diagnostic rate, which is consistent with research showing base rates of impaired scores increase with the length of a test battery. The 6-test version had improved sensitivity to predict progression to dementia, and its MCI group had slightly higher risk of progressing to dementia than the 12-test version. Additional research on the effect of the number and type of tests used in actuarial MCI criteria is needed, especially given the large number of tests often included in clinical neuropsychological batteries.

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J.L. WOODARD, K.A. NIELSON, M. SEIDENBERG, J. SMITH, S. DURGERIAN & S. RAO. Early Reduction of Auditory Verbal Learning Test Learning Slope in Apolipoprotein E ε4 Carriers with Preclinical Mild Cognitive Impairment.

Objective: Episodic memory changes are commonly leading indicators of preclinical dementia, often showing earlier dynamic changes than fluid biomarkers. However, there has been relatively little investigation of learning slope declines as an early marker of mild cognitive impairment (MCI) risk. We contrasted three indexes of learning rate over trials in a 4.5 year-long prospective study of a well-defined group of apolipoprotein E (APOE) ε4 carriers to identify potential markers of incipient MCI conversion.

Participants and Methods: Twenty-nine initially healthy, older adult APOE ε4 allele carriers (M_{age}=71.9 years, SD=4.4; 24% male) underwent structural MRI and were administered the Rey Auditory Verbal Learning Test (AVLT) at baseline, and at 1.5 and 4.5 years as part of a larger evaluation. Ten participants converted to MCI according to

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Petersen criteria after 4.5 years. Using baseline AVLT performance, latent learning slope and intercept were calculated from latent growth curve modeling, and a regression-based learning slope (regressing recall scores for Trials 1-5 on trial numbers) and the recall difference between Trials 5 and 1 were computed. MCI converters and non-converters were compared on baseline AVLT learning slope indexes and normalized hippocampal volumes (HV).
Results: Conversion to MCI was not associated with age, sex, education, baseline recall on AVLT Trial 1, or right or left HV. In contrast, relative to non-converters, carriers who converted to MCI showed significantly flatter latent learning slopes (1.6 vs. 1.2, p<.001, d=1.46) and regression-based learning slopes (1.5 vs. 0.9, p=.004, d=1.31), and smaller recall differences between Trials 5 and 1 (6.2 vs. 3.7, p=.01, d=1.26). All learning slope measures showed modest correlations with baseline HV (r=.32-.41).
Conclusions: Three different markers of learning slope were significantly reduced at baseline in initially healthy APOE ε4 carriers who converted to MCI within 4.5 years. Reductions in learning rate may signal incipient MCI in healthy older adults.
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Symposium 13. Cognition in Action: Considerations for Defining Complex Cognitive Constructs of Everyday Functioning

Chair: Maria T. Schultheis

Presenters: Jillian Tessier, Tania Giovannetti, Preeti Sunderaraman, Martina Azar, Rebecca Williams

3:30–5:00 p.m.

M.T. SCHULTHEIS & J. TESSIER. Cognition in Action: Considerations for defining complex cognitive constructs of everyday functioning.
Neuropsychological measurement has traditionally relied on domain-specific, highly controlled methods. Conclusions about "real world" behavioral outcomes, such as vocation, social relationships, and functional independence are subsequently drawn from these measures. Given the complexity of these outcomes, it is arguable that there may not be a direct relation with single cognitive domains. Measurement and conclusions may be enriched by considering cognition in action, namely complex and integrative cognitive constructs with functional implications. These constructs may better approximate, or even predict, functional outcomes. Defining these constructs will require expanding domain-specific focus and incorporating interdisciplinary conceptualization to integrate cognitive, emotional and social aspects of everyday functioning. Thus, there is a unique opportunity for the field of neuropsychology to lead the movement toward operationalizing and quantifying "cognition in action" to potentially improve research and clinical outcomes.
The current symposium will define several integrative constructs and put forward ecologically valid methodology for assessment. This includes 1) financial decision-making, 2) multitasking, 3) emotional intelligence, 4) self-awareness, and 5) goal-directed everyday actions. Presentations will include a discussion of the theoretical underpinnings of each construct, presentation of new measurement tools and pilot research data will be presented to exemplify these constructs. Finally, differences from traditional/historical views and measures of cognition will be discussed. The session will conclude with a discussion about the implications of integrating these constructs into research and clinical practice and make suggestions for future directions for intervention. Presentations will have a specific focus on considerations for the needs of neurological populations, such as dementia and older adults, traumatic brain injury, multiple sclerosis.
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J. TESSIER, C. HICKEY, J. SCOTT & M.T. SCHULTHEIS. Conceptual Model for the Measurement of Multitasking.
Objective: It has been conceptualized that executive functioning (EF) is an umbrella term under which more integrative cognitive constructs fall, including multitasking. While multitasking may better approximate real-world functioning than a single, isolated cognitive domain, it has been defined by researchers in divergent ways. Specific definitions, related syndromes, and the challenge of variability in these conceptualizations will be discussed.
Participants and Methods: In the present research, multitasking is operationalized as an ability to complete multiple interleaved tasks in a time effective manner by switching and resuming them through interruptions. Several researchers have developed performance-based measures of multitasking that more closely approximate natural environments. The history of these tasks will be presented, as well as the process by which the current research group developed the Vocational Multitasking Test (VMT) to measure multitasking ability with work-specific tasks.
Results: Cognitive and neuroanatomical systems that underpin multitasking ability have been put forward. Memory, attention, and EF are theorized to contribute to multitasking ability. Proposed neuroanatomical correlates include frontostriatal regions. Thus, multiple clinical groups that experience changes in frontal systems, including traumatic brain injury (TBI) and multiple sclerosis (MS) may experience multitasking difficulty that prevents resumption of premorbid functioning, such as vocational functioning. Preliminary results of VMT studies in MS and TBI will be presented.
Conclusions: Given the need for additional research, as well as the potential for clinical deficits, multitasking measurements are needed. Traditional neuropsychological tasks may fail to capture the complexity of multitasking, and thus have less predictive power in research or clinical contexts. The VMT is an applied vocational multitasking measure with research and rehabilitation application.
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T. GIOVANNETTI. Neuropsychological Models for Goal-Directed, Everyday Activities: Focus on Improving Neuropsychological Assessment of Dementia and MCI.
Objective: Neuropsychological tests isolate and quantify specific cognitive processes to facilitate diagnoses in older adults with cognitive complaints, but they do not neatly map onto daily activities, leaving important clinical questions unresolved. The psychological research on goal-directed everyday action will be reviewed and recommendations will be made for improving the ecological validity of neuropsychological assessment.
Participants and Methods: Theoretical models from cognitive psychology, cognitive neuroscience, and computational cognitive psychology; case studies from classic neurology and cognitive neuropsychology; and group data from more recent neuropsychological publications were reviewed and synthesized to identify conceptual themes. The methods used in these literatures also were reviewed.
Results: Early models focused on identifying the specific cognitive operation(s) crucial for everyday functioning (i.e., semantic knowledge vs. sequential processing). More contemporary models acknowledge the complexity of everyday tasks and identify dissociable cognitive constructs that are recruited to achieve task goals, including object selection, sequential processing, resistance from interference, error monitoring, etc. Many studies have used detailed performance-based measures, and new technologies (i.e., virtual reality, sensors) may enable

efficient measurement of everyday action; however, many new technologies have not been informed by theoretical models.
Conclusions: Incorporating measures of the cognitive processes required for goal-directed everyday activities may improve the ecological validity of neuropsychological assessments for older adults. New technologies have great potential to efficiently improve the ecological validity of neuropsychological assessment, but their utility may be improved by synthesis with neuropsychological models of everyday action.
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P. SUNDERARAMAN, S. HO, L. KABIR, Y. STERN & S. COSENTINO. The Influence of Education, Math skills and Well-being on Objective Financial Decision Making.

Rationale: In healthy elders, financial decision-making (FDM) – a critical multidimensional functional ability – is influenced by a host of factors including mathematical ability, demographics (age, sex, and education), and subjective characteristics such as well-being. However, the relative contributing role of each of these factors to FDM in healthy elders has yet to be fully understood. Understanding the unique and combined role of each of these factors has implications for identifying vulnerable individuals, and thus will help to prevent consequential financial mistakes. The current study aimed to investigate the extent to which mathematical ability, demographics, and well-being contributed to FDM. **Participants and Methods:** The sample, recruited from a larger, ongoing study, consisted of 47 older adults (mean age = 69 years, SD = 5.10; mean education = 15.96 years, SD = 2.22; 60% female, and 68% Caucasian). FDM was objectively measured using the Financial Competence Assessment Inventory, Math skills were measured using WAIS-III Arithmetic and WRAT-IV Math, and well-being using Satisfaction with Life Scale. **Results:** After adjusting for multicollinearity, multiple regression analyses revealed that the overall model was significant (F =7.45, p = .001) and explained 35.3% of the variance in FDM. WAIS-III Arithmetic (instead of WRAT-IV Math) predicted FDM to a higher extent than years of education or subjective well-being. **Conclusions:** While the importance of Math skills for making sound financial decisions is hard to dispute, more research is needed to understand whether Math skills continue to be important when other cognitive variables such as memory and executive functioning are considered.
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M. AZAR, S. COSENTINO, S. CHAPMAN, J. TESSIER, G. NAVARRO, C. JACIAL, L.E. COLVIN, Z. ZHANG & M.T. SCHULTHEIS. Investigating Online and Offline Awareness of Executive Dysfunction in Individuals with TBI.

Objective: Self-awareness (SA) is a construct of clinical significance given its impact on prognosis and functional outcomes in neurological populations. Few studies have demonstrated an association between SA and cognitive abilities, such as executive functions(EF), but none have explored if this relationship differs between offline and online measures of SA. This preliminary study employs a multidimensional approach to examine both *offline* (OfA; global awareness) and *online* (OnA; ongoing SA)awareness of EF in individuals with mod-severe TBI.
Participants and Methods: 20 participants (15 HC, 5 TBI) completed EF and SA measures. Each participant's informant filled out an EF skills questionnaire (DEX). OfA was measured as the discrepancy between informant and participants' global assessment on DEX. OnA was measured as the discrepancy between objective performance and participants' prospective rating of specific EF tasks. One-way ANOVAs compared HC and TBI performance on domain-specific OnA(i.e., problem-solving, organizing, set-switching)and overall OfA. One-sample t-test examined differences between OnA and OfA in the TBI group.
Results: Individuals with TBI endorsed fewer symptoms (M=11,SD=16.4) than informants on the DEX (i.e., lower OfA) compared to their HC counterparts (M=-6,SD=14.2), F(18)=5.01, (p<0.05). OnA of problem solving, organizing, and set-switching were not significantly different. However, OnA of set-switching emerged as an area of impairment in TBI relative to other OnA domains and OfA, indicating overconfidence in set-switching in TBI t(4)=-4.39, p<0.05.
Conclusions: These preliminary results indicate global and specific areas of impairment in SA of executive dysfunction in TBI. Understanding nuanced differences of SA dimensions may inform on everyday performance and clinical intervention, including promising EF-specific strategies. Future research should capture relationships with functionally meaningful outcomes, such as vocational outcome after TBI.
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R. WILLIAMS, J. TESSIER & M.T. SCHULTHEIS. Emotional Intelligence: An Argument for Measurement in Neurological Populations.

Objective: Various aspects of "social cognition", such as interpersonal understanding, self-awareness, insight, and emotional control, have been increasingly investigated in neurological populations as interest in these outcomes and their sequelae continues to grow. Definitions of social cognition across literature are related, but not identical, and are often used interchangeably. Gold-standard interventions are impossible to establish without consistent research, which requires consistent measurement and operationalized variables. The objective of this symposium presentation is to demonstrate the utility of embracing Emotional intelligence (EI), a well-established construct in social psychology, in bridging this gap.
Participants and Methods: A review of the literature was conducted to examine existing definitions and theories of EI, and their applicability to the fields of neuropsychology and neurorehabilitation.
Results: Three prominent models of EI, Meyer-Salovey, Goleman and Bar-On, are discussed. The latter is identified as particularly primed for use in neuropsychological research, as it has been found to be dissociable from cognitive intelligence. Additionally, its theoretical focus on psychosocial outcomes makes it optimal for use in neurorehabilitation research.
Conclusions: EI, particularly a model independent from cognitive function with a brief and accessible evaluation, is primed for integration into research and practice, and holds the promise of cohesion in a diverse field of interest. To efficiently develop targeted treatments for the intra-and interpersonal difficulties, we must start with a unifying term in order to conduct systematic research. Both clinicians and researchers interested in cognitive rehabilitation would benefit from such comprehensive operationalization. Because of its potential to address this need, EI holds promise in elucidating the nature of social functioning in neurological populations.
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Paper Session 14. Adult TBI

Moderator: Jose Lafosse

3:30–5:00 p.m.

D. KRCH, L. FRANK, N.D. CHIARAVALLOTI, E. VAKIL & J. DELUCA. Cognitive Reserve Protects Against Memory Decrements Associated with Neuropathology in Traumatic Brain Injury.

Objective: To verify behavioral evidence of cognitive reserve (CR) in traumatic brain injury (TBI) and evaluate whether CR moderates the relationship between neuropathology and cognitive outcomes.

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Participants and Methods: Sixty-one adults with TBI underwent a comprehensive neuropsychological evaluation and structural neuroimaging. Principal components analyses were used to create composites for contextualized and non-contextualized memory, attention, executive function, and processing speed domains. Premorbid cognitive ability was used as a proxy for CR, and was estimated using a test of word reading (Wechsler Test of Adult Reading). Diffusion tensor imaging (functional anisotropy) was used to quantify degree of neuropathology.
Results: Behavioral results revealed that individuals with higher CR performed significantly better than those with less CR in contextualized memory [F=12.09, p=.002, ω^2=.24] and executive function [F=4.53, p=.04, η^2_p=.12] domains, but not in non-contextualized memory, attention or processing speed. Moderation analyses showed interactions between neuropathology and both contextualized [R^2 change due to interaction=.11] and non-contextualized [R^2change due to interaction=.03] memory, whereas at lower levels of neuropathology, people with higher CR exhibited better memory than those with lower CR. This benefit diminished as neuropathology increased, and disappeared at the highest levels of neuropathology. CR was found to no longer exert a protective effect at premorbid intelligence levels below average.
Conclusions: Intellectual enrichment mitigated the negative effect of TBI-related neuropathology on memory, but not on other cognitive domains. Thus, CR may differentially protect some cognitive domains against neuropathology relative to others. The finding of a clinical cutoff for CR's protective effects at higher levels of neuropathology may be instructive for prognostication and clinical decision-making after TBI.
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E. WEBER, H. KLECHA, J. DELUCA & N.D. CHIARAVALLOTI. Visuospatial Functioning Predicts Benefit from Imagery-Based Memory Treatment in Individuals with TBI.
Objective: To explore the relationship between visuospatial functioning and ability to benefit from an imagery-based memory treatment in individuals with traumatic brain injury (TBI).
Participants and Methods: Participants included 25 adults with moderate-to-severe TBI and impaired learning who were drawn from the treatment group of an RCT examining the efficacy of the modified Story Memory Technique (mSMT; Chiaravalloti et al., 2016), a 10-session intervention that teaches use of context and imagery to improve learning and memory. Participants underwent a comprehensive neuropsychological battery pre-and post-treatment, which included the CVLT-II and WASI. Visuospatial functioning was operationalized as the mean T-score on WASI PIQ tests (i.e., Matrix Reasoning, Block Design). The sample was divided by median split into Low PIQ (n=12) and High PIQ (n=13) groups, which did not differ on demographic (e.g., age), injury (e.g., months since TBI), or psychiatric characteristics (e.g., depressive symptoms).
Results: A mixed model ANOVA revealed a significant interaction between assessment (i.e., baseline vs. follow-up) and WASI PIQ mean T-score on CVLT-II Total Learning T-score [F(1,23)=9.25; p=0.006; partial eta-sq=0.287]. Follow-up analyses revealed a significant difference between pre- and post-treatment CVLT-II Total Learning T-score in the Low PIQ group [t(11)=-2.844; p=0.016], whereas there was no difference in the High PIQ group [t(12)=0.897; p=0.387; Hedge's g difference=0.50]. There was no significant difference between PIQ groups on CVLT-II at follow-up [Low PIQ=39.0; High PIQ=38.77; t(23)=0.05; p=0.961].
Conclusions: Results suggest that the mSMT may be an effective method of improving list learning in individuals with TBI with relatively impaired visuospatial functioning, but not in those with preserved visuospatial functioning. This finding underscores the need to broadly assess pre-treatment cognitive characteristics when determining appropriateness of specific cognitive rehabilitation interventions.
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J.L. PONSFORD, E. FRASER, K. BIERNACKI, D. MCKENZIE & M. DOWNING. Cognitive Reserve And Age Predict Cognitive Recovery Following TBI.
Objective: Injury-related cognitive impairments are a major determinant of functional outcome after TBI. Whilst studies have documented cognitive deficits and their predictors at a single time-point post-injury, little is known of factors associated with long-term recovery of cognitive functions after TBI. This longitudinal study examined the association of age, IQ and PTA duration with cognitive recovery 2-5 years following TBI.
Participants and Methods: 107 individuals with mild to severe TBI, M_{age} 44.38 years (SD=16.93), M_{educ} 14.04 years (SD=3.38), M_{PTA} = 21.66 days (SD=19.33) and mean IQ 109 (SD=8.22) were assessed initially within 2 weeks of PTA emergence and reassessed an average 44.65 months post-injury (SD= 14.5). A matched healthy control group (n=63) with M_{age} 46.92 years (SD = 15.54), M_{educ} 13.34 years (SD = 2.23), and M_{IQ} 107.21 (SD = 7.51) completed measures once. Measures included the NART to assess premorbid IQ, WAIS-IV Digit Symbol Coding (DSCT) measuring processing speed, Rey Auditory-Verbal Learning test (RAVLT) assessing memory and Trail Making Test Part B (TMT-B) assessing executive function. Regression analyses examined predictors of cognitive performance.
Results: At initial assessment participants with TBI performed significantly worse than controls on all measures (all p<.001), and age, PTA and IQ were significant predictors of performances on all tasks. Performances on all tasks improved significantly in the TBI group at 2-5 year follow-up. Premorbid IQ was significantly associated with gains on all three measures, after accounting for initial performance ($\beta = 0.35$, $p < .001$), RAVLT ($\beta = 0.22$, $p < .05$), and TMT-B ($\beta = -0.43$, $p < .001$). Age was associated with gains on DSCT ($\beta = -0.35$, $p < .001$) and TMT-B ($\beta = 0.28$, $p < .05$). PTA duration was not significantly associated with cognitive recovery on any measure.
Conclusions: Findings support the contention that cognitive reserve and to a lesser extent age determine degree of long-term cognitive recovery following TBI.
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E.K. BRENNER, E. GROSSNER, R.A. BERNIER & F.G. HILLARY. The Benefit of Network Hyperconnectivity After Traumatic Brain Injury is Dependent on Cognitive Reserve.
Objective: Cognitive reserve (CR) has been proposed as a protective mechanism against neurologic disruption (Stern, 2012), but its influence on connectivity after traumatic brain injury (TBI) remains unclear. We used fMRI and measures of premorbid functioning to examine the relationship between metrics of connectivity and CR on processing speed (PS) in patients with moderate/severe TBI.
Participants and Methods: 18 patients with TBI and 18 matched healthy controls (HC) underwent resting-state fMRI and neuropsychological testing. Graph theory was used to examine connectivity profiles across functionally defined regions of interest (Power et al., 2011). Cost was defined by summing the product of the strength and distance of each node's total connections. Hubs were defined as having cost greater than 1.5 standard deviations above the group mean. Analyses focused on the executive control (ECN) and default mode networks (DMN), which have been associated with dysfunction in TBI, and PS was measured using the Visual Search and Attention Test.
Results: Results showed significant interactions between CR and injury status where CR was associated with PS in the TBI sample, p<0.05. In the TBI sample, an interaction was observed when examining overall ECN cost, where at low cost, CR was not associated with PS, but at high

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cost, CR was associated with better PS, $p<0.05$. The same relationship was observed when examining average DMN cost as well as ECN and DMN hub costs, $p<0.05$.

Conclusions: Results demonstrate that as CR increases, the strength of the relationship between cost and PS increases. This relationship appears to be driven by hubs in the ECN and DMN. These data reveal that while hyperconnectivity is a common response to neurologic disruption (Hillary et al, 2015), the efficiency of a network's response may be linked to CR. These data help explain mixed findings in the literature examining hyperconnectivity and cognitive outcome, since for individuals with higher CR, hyperconnecting after injury may facilitate cognitive performance.

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J. SCHAFFERT, C. LOBUE, C. WHITE, N. DIDEHBANI, J. HART, H.C. ROSSETTI, L. LACRITZ & C. CULLUM. Traumatic Brain Injury History and Dementia Onset in Autopsy-Confirmed Neurodegenerative Conditions.

Objective: Traumatic brain injury (TBI) with loss of consciousness (LOC) has been linked to greater accumulation of tau and alpha-synuclein, which may lead to earlier dementia onset. However, the relative effect of TBI on symptom onset across different neurodegenerative conditions is uncertain. We examined the relationship between TBI and age of onset in autopsy-confirmed Alzheimer's disease (AD), mixed AD and Lewy body disease (AD+LBD), pure LBD, and frontotemporal lobar degeneration (FTLD).

Participants and Methods: Data from participants with autopsy-confirmed AD (n=966), AD+LBD (n=369), LBD (n=226), and FTLD (n=328) were obtained from the National Alzheimer's Coordinating Center. Participants were grouped by history of TBI with LOC occurring ≥1 year prior to their first clinical visit. Chi-square and t-tests were used to assess group differences in other potential contributors to age of onset. Significant differences were used as covariates in ANCOVAs comparing age of onset between TBI groups in the neuropathological cohorts. Cohen's d effect sizes were used to compare the effect of TBI on age of onset across cohorts.

Results: TBI with LOC was associated with a 2.8-year earlier onset of AD (F=4.1, p=.043, d=0.28), a 4.7-year earlier onset of AD+LBD (F=6.8, p=.009, d=0.51) and a 4.1-year earlier onset of FTLD (F=4.6, p=.033, d=0.48). Similar mean differences were observed in both FTLD-tau and FTLD TDP-43, although analyses were underpowered due to small sample sizes. No association was observed in LBD alone (F=0.01, p=.933, d=0.15).

Conclusions: Compared to AD, TBI had a larger effect on AD+LBD onset and FTLD onset, while no relationship between TBI and LBD onset was observed. This pattern suggests TBI may interact more with tau than alpha-synuclein and TBI may not have a large enough effect on alpha-synuclein to influence age of onset in pure synucleinopathies. The effect of TBI on onset of FTLD Tau vs TDP-43 is unclear and future studies should aim to examine this association with larger sample sizes.

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E. DENNIS, E.A. WILDE, B. WADE, R. MOREY, C. HASWELL, P. THOMPSON, P. KOCHUNOV, N. JAHANSHAD & D. TATE. Neural Correlates of Depressive Symptoms after Brain Injury: Preliminary Results from the ENIGMA Military Brain Injury Group.

Objective: Individuals who have sustained a TBI are approximately four times more likely to experience depression, but the neural substrates of post-injury depression, are unknown. Our objective was to examine post-injury depression in a military cohort using a meta-analytic framework.

Participants and Methods: Participants were assessed across 3 projects, for a total of 107 TBI participants and 153 comparison participants. Participants were either Veterans or Active Duty Service Members of the United States military. Sites processed diffusion MRI brain scans locally with a harmonized protocol based on TBSS (tract-based spatial statistics) (http://enigma.usc.edu). Fractional anisotropy (FA) and diffusivity measures were calculated and averaged across the entire ENIGMA-DTI skeleton, and 24 regions of interest from the JHU atlas. Depressive symptoms were assessed with different scales across sites (GDS, BDI, CES-D), using published clinical cutoffs to yield a binary depression variable. Depressed participants were compared to non-depressed, separately for TBI and control groups. Effect sizes were calculated within each site and pooled across sites to conduct a meta-analysis. Results were corrected for multiple comparisons using a Bonferroni correction ($p<0.05/25 = 0.002$).

Results: Within the control group, there were no significant differences in those meeting criteria for depression (27 depressed, 126 non-depressed). Within the TBI group (29 depressed, 78 non-depressed), we found marginally significant higher FA in depressed individuals in the uncinate (Cohen's $D=0.56$, $p=0.047$, left uncinate Cohen's $D=0.73$, $p=0.0093$).

Conclusions: The uncinate is a key component of the limbic system, central to emotion regulation. Depression has typically been associated with reduced connectivity in the uncinate, opposite to our results. This may indicate different mechanisms in TBI-associated depression.

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Paper Session 15. Cancer Across the Lifespan

Moderator: William Mautz

3:30–5:00 p.m.

L. JACOLA, L. HALL, D. PEI, C. CHENG, K.R. KRULL, W. REDDICK, C. PUI, S. JEHA & H.M. CONKLIN. Impact of Intensified Intrathecal (IT) Therapy on Acute and Long-term Neurocognitive Outcomes in Children with Acute Lymphoblastic Leukemia (ALL).

Objective: In childhood ALL, replacing cranial irradiation (CRT) with intensified systemic and IT chemotherapy for CNS-directed therapy have reduced acute and long-term neurotoxicity with no adverse survival impact. However, survivors not receiving CRT are still at risk for neurocognitive deficits. This study examined the impact of triple IT (methotrexate, hydrocortisone, cytarabine) during the initial 6-week remission induction on neurocognitive function 8-10 weeks later at reinduction (RE) and at the end of 2.5 years of therapy (ET), hypothesizing that intensified IT would be associated with reduced function.

Participants and Methods: A total of 437 patients received IT according to the risk for CNS relapse. Of these, testing was completed in 328 at RE (56% male; 48% low risk; mean age-diagnosis=7.2 yrs) and 356 at ET (57% male; 48% low risk; mean age-diagnosis=7.1 yrs). Domains assessed included intelligence and working memory (Stanford Binet EIQ, Bead Memory), attention (Continuous Performance Test), processing speed and retrieval fluency (Woodcock-Johnson-3 Visual Matching, Retrieval Fluency), verbal learning (California Verbal Learning Test), visual-motor control (Beery Visual Motor Integration) and fine motor speed (Purdue Pegs).

Results: Patients received 2-7 IT doses during remission induction; most had 2 or 6 (44%, 48%). Age-standardized mean scores were within expectations at RE and ET. Compared to population expectations (16%), more patients scored at-risk (<1SD) at RE and ET on attention variability (26%, 31%), visual-motor control (21%, 27%) and fine motor speed (37%, 40%). At ET, higher at-risk rates were also seen on processing speed (21%) and retrieval fluency (20%; 2-sided ps ≤0.04). Higher IT (5-7 doses) predicted lower EIQ, working memory,

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verbal learning, and visual-motor control at RE (d=0.23-0.36), and more attention variability at ET (d=0.21; 1-sided $ps \leq 0.04$).
Conclusions: Early intensification of IT may have acute and long-term neurocognitive impact. Contribution of other factors is being investigated.
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N.D. SABIN, P. BANERJEE, W. REDDICK, W. LIU, J.O. GLASS, D. SRIVASTAVA, L.L. ROBISON, M.M. HUDSON & K.R. KRULL. Cortical Thickness and Neurocognitive Performance in Adult Survivors of Hodgkin Lymphoma.
Objective: To examine associations between cortical thickness and neurocognitive function in adult survivors of Hodgkin lymphoma (HL) compared to age, sex and race/ethnicity matched community controls.
Participants and Methods: 204 survivors of childhood HL and 205 community controls underwent neurocognitive testing (WASI IQ, Trail Making Test, Continuous Performance Test, CVLT, Wechsler Processing Speed, Grooved Pegboard). Isotropic 3D T1-weighted MR imaging was acquired and analyzed with FreeSurfer software to assess cortical thickness. Neurocognitive functions were evaluated as age-adjusted z-scores referenced to normative data. Two-sample t-tests were used to compare outcomes between survivors and community controls, stratified by sex. Among survivors, general linear models (GLM) were used to examine associations between neurocognitive and cortical thickness measures that differed from controls.
Results: Male survivors performed worse than controls on verbal IQ (p=0.02), focused attention (p=0.002), sustained attention (p=0.01), visual processing speed (p=0.0001) and cognitive flexibility (p=0.009). Female survivors performed worse than controls on total verbal memory (p=0.001), short-delay free recall (p=0.002), long-delay free recall (p=0.01) and motor dexterity (p<0.001). Compared to same sex controls, male survivors demonstrated thinner cortices in the right entorhinal cortex (p=0.02) and left temporal pole (p=0.02), while female survivors demonstrated thinner bilateral middle temporal cortices (p's<0.002). In males, a thinner left temporal pole cortex was associated with lower cognitive flexibility (p=0.03). No associations were detected between cortical thickness and neurocognitive outcomes in females.
Conclusions: Adult survivors of childhood HL demonstrate neurocognitive impairment in multiple domains that appear to be sex-specific. In males, cortical thickness in the temporal lobes is associated with some of these deficits.
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P. BANERJEE, W. LIU, Y. YASUI, N. BHAKTA, T.M. BRINKMAN, I. TONNING OLSSON, I. HUANG, R.B. KHAN, G.T. ARMSTRONG, D. SRIVASTAVA, L.L. ROBISON, M.M. HUDSON & K.R. KRULL. Comorbid Neurocognitive Impairment in Long-Term Survivors of Childhood Cancer: A Report from the St. Jude Lifetime Cohort Study.
Objective: To characterize comorbid neurocognitive impairment across domains in long-term survivors of childhood cancer.
Participants and Methods: 2,726 adult survivors of childhood cancer (mean [SD] age 34.1 [9.3] years; 23.1 [8.3] years post-diagnosis; 55% female; 40% leukemia; 12% central nervous system tumor) and 357 community controls (mean [SD] age 35.2 [10.2] years; 55% female) completed neuropsychological tests to generate 20 measures, with 4 in each of 5 cognitive domains. Moderate to severe neurocognitive impairment was defined as age-adjusted z-scores ≤ -2.0 with reference to normative data. Multivariable regression analysis was used to compare the risk of impairment between survivors and controls within domains and examine the effects of sex and age at diagnosis within survivors.
Results: In each of the 5 domains, 9.9 - 20.0% of survivors had 1 impaired measure and 6.6 - 10.0% of survivors had 2+ impaired measures, compared to the expected impairment rate of 2% in the general population. Compared to controls, survivors were 2-4 times more likely to have 1 impaired measure within a domain (relative risks [RRs]: IQ/academics 3.04, attention 2.10, processing speed 3.66, memory 2.54, executive function 2.42; all p's < 0.05) and 4-9 times more likely to have 2+ impaired measures within a domain (RRs: IQ/academics 9.21, attention 3.92, processing speed 7.07, memory 3.74, executive function 6.94; all p's < 0.05). Within survivors, each year older at diagnosis decreased risk of 2+ impairments by 3-9% within each domain (all p's < 0.05). Female sex was associated with lower risk of impairment in processing speed (RR 0.72, 95% CI 0.52-0.99) but higher risk of memory impairment (RR 1.89, 95% CI 1.44-2.48) for 2+ impaired measures.
Conclusions: Long-term survivors of childhood cancer are at significantly higher risk for comorbid cognitive impairment compared to community controls, suggesting that a multi-faceted therapeutic approach is needed to address the comorbidity of cognitive impairment.
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M. PARTANEN, A. VILLAGRAN, L. HALL, D. PEI, C. CHENG, C. PUI, K.R. KRULL, H.M. CONKLIN, B. MANDRELL & L. JACOLA. Predicting Quality of Life (QOL) Among Survivors of Childhood Acute Lymphoblastic Leukemia (ALL) Using On-Therapy Neurocognitive Assessment.
Objective: ALL is the most common childhood cancer, with 5-year survival rates greater than 90% in contemporary clinical trials. However, survivors are at-risk for neurocognitive deficits that impact daily life. While neurocognitive assessment during treatment is recommended, the optimal timing and domains of assessments are not well-defined. The objective of this study is to prospectively examine the relationship between on-therapy neurocognitive function and QOL 2 years after therapy completion in ALL survivors treated with contemporary therapy. We hypothesized that worse performance on neurocognitive measures would predict lower QOL.
Participants and Methods: Patients diagnosed with ALL between 4-18 years (n=88, 44% female, $M[SD]$=10.0[3.9]) completed neurocognitive assessments including estimated IQ (EIQ; Wechsler) and attention (CPT; Conners Parent Rating) at the end of 6-week remission induction, 6 months after diagnosis prior to reinduction treatment, and at the end of 2.5 years of treatment. QOL ratings (PedsQL Generic) were completed 2 years post therapy. Linear regression was used to examine associations between neurocognitive and QOL measures.
Results: Age-adjusted EIQ was slightly above the expected value of 100 (M induction=104.5, reinduction=103.6, end of therapy=103.9, p<.05). QOL did not differ from healthy peer expectations (p>.10). At all time points, a greater frequency of patients scored at-risk (>1SD, 16% expected) for problems with attention (e.g., CPT Impulsivity, 51, 61, 58%, p<.05) and ratings indicated elevated psychosomatic symptoms (Conners Psychosomatic, 64, 73, 60%, p<.05). Elevated ratings of attention problems at induction (e.g., Conners Impulsivity r=-0.27-0.42, p<.05), reinduction (r=-0.22-0.24, p<.05), and end of therapy (r=-0.26-0.42, p<.05) predicted lower QOL.
Conclusions: Assessment of neurocognitive problems starting early in treatment can help to identify patients who are at greatest risk for lower QOL during long-term survivorship.
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A.E. CHILD, E.A.H. WARREN, P.T. CIRINO, J. BICK, S.P. WOODS, C.G. MINARD & L.S. KAHALLEY. Academic Fluency in Pediatric Brain Tumor Survivors Treated with Proton Versus Photon Radiation Therapy.

Objective: Proton beam radiation therapy (PBRT) reduces exposure of healthy tissue to radiation, which may minimize cognitive late effects in pediatric brain tumor patients. This study compared cognitive and academic outcomes in survivors treated with PBRT versus photon radiotherapy (XRT) and evaluated the degree to which group differences in academic fluency are mediated by cognitive ability.

Participants and Methods: Survivors treated with XRT (n=29) or PBRT (n=54) completed cognitive (WISC-IV/WAIS-IV Processing Speed Index; WISC-IV/WAIS-IV Vocabulary; CPT-II; DKEFS Verbal Fluency Switching) and academic (WJ-III Reading, Writing, Math Fluency) testing. Patients had a range of tumor histologies (21.7% glioma, 38.6% PNET/medulloblastoma, 13.3% ependymoma, 15.7% germ cell, 10.8% other), and were >1 year post-radiation. Multiple mediation analyses were conducted.

Results: Results revealed that PBRT patients outperformed XRT patients on most cognitive measures (vocabulary, processing speed, shifting; $\beta = .31$, $p < .01$ to $\beta = .42$, $p < .001$) and all fluency measures (Reading Fluency: $\beta = .40$, $p < .001$; Writing Fluency: $\beta = .34$, $p < .001$; Math Fluency: $\beta = .43$, $p < .001$) after controlling for relevant medical variables. In addition, vocabulary and processing speed significantly, and fully, mediated relations between group and all three fluency outcomes ($\beta = .07$, $p = .06$ to $\beta = .21$, $p < .001$).

Conclusions: Findings suggest that children treated with PBRT relative to XRT have better long-term academic fluency skills, which are associated with relatively preserved language (vocabulary) and speeded (processing speed) skills. These findings are encouraging for the neuroprotective potential of PBRT and are among the first to suggest improved long-term functional outcomes in individuals treated with PBRT versus XRT.

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I. TONNING OLSSON, N. ALBERTS, C. LI, P. BANERJEE, M. EHRHARDT, I. HUANG, D. SRIVASTAVA, L.L. ROBISON, M.M. HUDSON, K.R. KRULL & T.M. BRINKMAN. Pain and Neurocognitive Outcomes in Adult Survivors of Childhood Cancer.

Objective: To examine associations between pain and neurocognitive impairment in adult survivors of childhood cancer.

Participants and Methods: 2461 survivors (51% male; mean[SD] age 32[8] years; years since diagnosis 23[8]) completed ratings of pain and emotional distress and underwent neuropsychological testing for attention (Continuous Performance Test Omissions, Variability, Detectability), memory (California Verbal Learning Test Total, Short-Delay Free Recall, Long-Delay Free Recall), executive function (Trails B, Digit Span Backward, Verbal Fluency), and processing speed (Trails A, Coding, Symbol Search). Neurocognitive impairment was defined as scores ≥2SD below normative data on any variable within a domain. Multivariable models examined associations between pain and neurocognitive impairment, adjusting for sex, race, age at diagnosis, and cancer treatment (cranial radiation [0Gy vs. >0 but <20Gy vs. ≥20Gy], high dose/intravenous methotrexate).

Results: 19% of survivors were impaired in executive function; 15% in attention; 12% in memory; and 10% in processing speed. 25% of survivors reported moderate to severe pain; 16% reported pain with no emotional distress. After adjustment for neurotoxic treatment exposures, survivors with pain and no emotional distress were at risk for impaired attention (Risk ratio [95% CI]; 1.7 [1.4-2.2]), memory (1.4 [1.1-1.8]), and executive function (1.6 [1.3-2.0]) compared to survivors with no pain and no emotional distress. The risk of neurocognitive impairment attributable to pain was greater than risk associated with exposure to methotrexate treatment and low dose cranial radiation (i.e. <20Gy).

Conclusions: Pain is associated with increased risk of neurocognitive impairment in adult survivors of childhood cancer. Further research is needed to understand potential mechanisms underlying this association in survivors (e.g. chronic health conditions, sedentary behavior, inflammation, stress).

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Paper Session 16. Pediatric Neuropsychology in Spanish-Speaking Countries

Moderator: Amy Connery

3:30–5:00 p.m.

J.C. ARANGO-LASPRILLA, D. RAMOS USUGA, I. BENITO SÁNCHEZ, I. ROMERO & R. OLIVERAS-RENTAS. An International Online Survey of Professions Practicing Pediatric Neuropsychology in Spanish-speaking Countries.

Objective: To better the understand the population of pediatric neuropsychologists in Latin America, Puerto Rico, and Spain, for instance what kind of training they received, what kind of work they do, what tests they use, what interventions they provide, and what are some of the perceived barriers in the field. **Participants**: 287 professionals working in the field of pediatric neuropsychology from 12 countries [Argentina, Bolivia, Colombia, Cuba, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Peru USA (Puerto Rico), and Spain] completed an online survey between May-July, 2018. Potential professionals were contacted via national professional associations and via the online social networks Facebook and Linked-In. Survey response rate was 68%. Respondents had an average age of 36.3±9.0 and 78% were women. **Results:** Most respondents reported having a post-graduate degree (57%), most commonly a one-year specialization (26%) or a master's degree (23%). Half were working full time (49%). The majority indicated that they worked in evaluation and diagnosis (76%) and/or cognitive rehabilitation (54%). They primarily worked with Attention Deficit Hyperactivity Disorder (62%), Specific Learning Disability (61%), and intellectual disability (53%). Over half of the sample reported using the Weschler Intelligence Scale (52%). Only half of the sample used normative data from their country (50%), with 30% using normative data from another country. The top perceived barriers for the development of neuropsychology in the region were the lack of clinical training programs (30%), economic resources (26%), and access to neuropsychological tests (25%). Finally, only 53% rated their clinical training as good or very good. **Conclusions:** This is the first international survey conducted to gather information about the field of pediatric neuropsychology in Latin America, Puerto Rico, and Spain. The implications of these results will be discussed.

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L. OLABARRIETA-LANDA, D. RIVERA, I. BENITO SÁNCHEZ, D. RAMOS USUGA & J.C. ARANGO-LASPRILLA. Normative data for 10 Commonly Used Pediatric Neuropsychological Tests in 11 Spanish-speaking Countries.

Objective: To present the methodology and resulting normative data on 10 neuropsychological tests from a large multi-national study of children and adolescents from 11 Spanish-speaking countries. **Method**: 6,030 healthy children from 34 cities in 11 countries (Chile, Colombia, Cuba, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Peru, Puerto Rico, and Spain) were evaluated. Inclusion criteria for all countries were to be between 6 to 17 years of age and have a score of ≥ 80 on the

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Test of Non-Verbal Intelligence (TONI-2), a score of <19 on the Children's Depression Inventory, and a T-score <65 on the Revised Child Anxiety and Depression Scale. Participants completed 10 neuropsychological tests in random order. Test scores were normed by country using multiple linear regressions and standard deviation of residual values. Age, age^2, sex, and the mean level of parental education were included as predictors in the regression models for each test score. If the factor was a significant predictor of score, it was included in the model to generate the normative data. **Results:** The regression model results and normative data tables by country will presented. Participants will be given practical examples to practice using the tables and the formulas to obtain a specific percentile score for a given test for a given child from a specific country. **Conclusions:** This is the largest international pediatric normative study of neuropsychological tests ever conducted in Spanish-speaking countries. The results permit neuropsychologists who work with native Spanish-speaking children to have a more accurate way to interpret cognitive function based on test score and age, sex, and/or parental educational level if relevant.

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I. BENITO SÁNCHEZ, D. RIVERA, D. RAMOS USUGA & J.C. ARANGO-LASPRILLA. Prevalence of Low Scores on Learning and Memory Test Outcomes in a Pediatric Sample from 11 Spanish-speaking Countries.

Objective: To determine the prevalence of low scores on two neuropsychological tests commonly used to evaluate learning and memory functions in children. **Method**: 6,030 healthy children from 10 countries in Latin America and Spain were administered Rey–Osterrieth Complex Figure (ROCF) and the Test de Aprendizaje y Memoria Verbal–Infantil (TAMV-I), a verbal learning and memory test for children. Inclusion criteria were: age between 6-17 years, born and currently living in the country where the protocol was conducted, spoke Spanish as native language, an Intelligence Quotient (IQ) of≥80 according to the Test of Non-Verbal Intelligence, a score of less than 19 on the Children's Depression Inventory, and being enrolled in a regular private or public school. 51.9% were girls, and the average age was 11.7±3.3 years. Z scores by country were calculated for ROCF Copy and Memory scores and TAMV-I Total, Delayed recall, and Recognition scores adjusting for age, age^2, gender, and mean level of parental education. Each Z score was converted to a percentile for each of the 5 sub-test scores. Each participant was categorized based on his/her percentile as less than the 25th, 16th, 10th, 5th, and 2nd. **Results:** Between 50.1% (Peru) and 61.9% (Chile) of the sample could be classified as having at least 1 of the 5 scores below the 25th percentile. Between 27.3% (Peru) and 39.2% (Puerto Rico) scored below the 10th percentile on at least 1 of the 5 scores. Between 10.7% (Honduras) and 16.1% (Cuba) scored below the 2nd percentile on at least one 1 the 5 scores. **Conclusions**: The results are consistent with other studies that found that low scores are common when multiple neuropsychological outcomes (tests and/or scores) are evaluated in healthy individuals. Clinicians should consider the higher probability of low scores in a given individual when evaluating learning and memory using various sets of scores to reduce false-positive diagnoses of cognitive deficits in that child.

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D. RAMOS USUGA, D. RIVERA, I. BENITO SÁNCHEZ & J.C. ARANGO-LASPRILLA. Prevalence of Low Scores on Executive Function Test Outcomes in a Pediatric Sample from 11 Spanish-speaking Countries.

Objective: To determine the prevalence of low scores for two neuropsychological tests with six total scores commonly used to evaluate executive functions in children. **Method**: 6,030 healthy children from 10 countries in Latin-America and Spain were administered Trail Making Test (TMT), Stroop Color-Word Interference Test and Modified Wisconsin Card Sorting Test (M-WCST). Inclusion criteria were: age between 6 to 17 years, born and currently living in the country where the protocol was conducted, spoke Spanish as native language, an Intelligence Quotient (IQ) of ≥80 according to the Test of Non-Verbal Intelligence, a score of less than 19 on the Children's Depression Inventory, and being enrolled in a regular private or public school. 51.9% were girls, and the average age was 11.7±3.3years. Z scores by country were calculated for TMT-B, Stroop Word-Color and Interference scores and M-WCST Categories, Perseveration errors, and Total errors scores adjusting for age, age^2, and sex, mean level of parental education. Each z score was converted to a percentile for each of the 6 test scores. Each participant was categorized based on his/her percentile as less than- 25th, 16th, 10th, 5th, and 2nd. **Results**: Between 69.8% (Paraguay) and 86.5 % (Guatemala) of the sample had at least 1 of the 5 scores below the 25th percentile. Between 22.3% (Paraguay) and 38.9% (Cuba) scored below the 10th percentile on at least 1 of the 5 scores. Between 4.1% (Guatemala) and 10.6% (Puerto Rico) scored below the 2nd percentile on at least 1 of the 5 scores. **Conclusions**: Consistent with existing research, low scores are common when multiple neuropsychological outcomes (tests and/or scores) are evaluated in healthy individuals. Clinicians working with Spanish-speaking children should consider the higher probability of low scores in a given individual when evaluating executive functions using various sets of scores to reduce false-positive diagnoses of cognitive deficits in a child.

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I. BENITO SÁNCHEZ, D. RIVERA, D. RAMOS USUGA, J. RESTREPO, N. CADAVID, Y. RODRIGUEZ & J.C. ARANGO-LASPRILLA. Prevalence of Low Scores on Psychomotor Speed and Attention Tests in a Spanish-Speaking Pediatric Population from 11 Countries.

Objective: To determine the prevalence of low scores on four neuropsychological tests with eight total scores commonly used to evaluate psychomotor speed and attention functions.

Participants and Methods: 6,030 healthy children from 10 countries in Latin America and Spain were administered Trail Making Test (TMT), Stroop Color-Word Interference Test, Symbol Digit Modalities Test (SDMT), and Concentration Endurance Test (d2). age between 6-17 years, born and currently living in the country where the protocol was conducted, spoke Spanish as native language, having an IQ of ≥80 according to the TONI-IV, having a score of <19 on the CDI, and being enrolled in a regular private or public school. 51.9% were girls, and the average age was 11.7±3.3 years. Z scores by country were calculated for TMT A, Stroop Color and Word scores, SDMT and d2 (TN, CR, TP, and CP) scores adjusting for age, age^2, gender, mean level of parental education, and all interaction variables if significant for the given country. Each z score was converted to a percentile for each of the 8 sub-test scores. Each participant was categorized based on his/her percentile as less than the 25th, 16th, 10th, 5th, and/or 2nd.

Results: Between 68.3% (Mexico) and 91.1% (Paraguay) could be classified as having at least 1 of the 5 scores below the 25th percentile. Between 28.1% (Spain) and 48.3% (Paraguay) scored below the 10th percentile on at least 1 of the 5 subtests. Between 4.8% (Puerto Rico and Spain) and 10% (Paraguay) scored below the 2nd percentile on at least 1 of the 5 scores.

Conclusions: The results are consistent with other studies that found that low scores are common when multiple neuropsychological outcomes (tests and/or scores) are evaluated in healthy individuals. Clinicians should consider the higher probability of low scores in a given individual when evaluating psychomotor speed and attention using various sets of scores to reduce false-positive diagnoses of cognitive deficits in that child.

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D. RIVERA, B. CAMINO, J. RASERO, R. ACOSTA, L. OLABARRIETA-LANDA, J.C. ARANGO-LASPRILLA & J.M. CORTES. Machine Learning Classification for Intellectual Disability.

Objective: To determine the machine learning classification strategy with the highest accuracy for discrimination between healthy children and those with intellectual disability (ID).

Method: 186 healthy children and 142 children with ID from Bogota, Colombia were evaluated. Inclusion criteria for healthy participants were 6-17 years of age, a score of≥80 on the Test of Non-Verbal Intelligence-2, and a score of<19 on Children's Depression Inventory. ID diagnosis was made according to DSM-V diagnosis criteria. The two groups were matched by age and sex. Participants completed 10 neuropsychological tests, which were used as features in the classification problem (healthy vs ID). Three machine learning strategies (OneR, SimpleCart, and REPTree) were used for feature selection to determine the best neuropsychological test scores for classification, and compared in relation to the following metrics: True Positive Rate (TPR), False Positive Rate (FPR), Precision and Accuracy. 10-fold cross validation was used to control the bias-variance tradeoff. **Results:** The best three neuropsychological test scores for classification between ID and healthy participants were the PPVT-3, SDMT and Token Test. According to the TPR (95.58%), FPR (1.61%), Precision (98.26%) and Accuracy (97.51%), the best method for classification was the REPTree algorithm. As a result, a score ≥ 60 in PPVT-3 test would classify the participant as healthy. If the score is <60, SDMT is also needed in the classification tree. Then, if the score in the SDMT is <28 (together with PPVT-3 <60) would classify the participant as ID, and if SDMT is ≥28, as a healthy participant.

Conclusions: PPVT-3, SDMT, and Token test participated the most in the classification of ID vs healthy participants. A REPTree algorithm provided the best performance to classify healthy vs. ID children with the highest accuracy and the lowest FPR. This algorithm suggests two cut-off points for PPVT-3, and SDMT that can be used for ID diagnose

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Paper Session 17. Parkinson's Disease / Movement Disorders

Moderator: Guy Vingerhoets

3:30–5:00 p.m.

K. BRESLIN, S. TSANG, C. MANNING, J. GONZALEZ MEJIA, M. BARRETT, J.L. FLANIGAN & S.A. SPERLING. The Moderating Effects of Cognitive Impairment and Depression on Perceptions of Behavioral Symptoms in Patients with Parkinson's Disease and Their Caregivers.

Objective: To understand the effect of cognitive impairment and depression in patients with Parkinson's disease (PD) on patient and caregiver (CG) perceptions of behavioral symptoms.

Participants and Methods: We examined data from 380 PD patients and 164 PD patient and CG dyads. We used the FrSBe, MoCA, and BDI-II or GDS to assess behavioral symptoms, cognition, and depression, respectively. We examined all associations with Pearson correlations and the differences between associations with t-statistics.

Results: PD patients and CG FrSBe scores were positively correlated. In PD patients, with the exception of disinhibition scores, cognition was negatively correlated with both retrospective and current total and domain specific FrSBe scores (r -.20 to -.34, all p <.05). Cognition and FrSBe scores were not correlated in caregivers. Analyses using the BDI-2 and GDS yielded similar results. In PD patients, depression was weakly to moderately correlated with retrospective FrSBe scores (r .19 to .27, all p <.05) and more strongly correlated with current FrSBe scores (r .49 to .61, all p <.001). A similar, but attenuated pattern was observed in caregivers. Analyses of the differences between PD patient and CG dyads showed that the negative correlations between cognition and retrospective and current FrSBe scores were almost universally stronger in PD patients than caregivers (p <.001 to .025). Depression was more strongly correlated with current FrSBe scores in PD patients, with the exception of disinhibition scores (p <.001 to .025). Depression, as measured by the GDS, was more strongly associated with a greater change in executive dysfunction scores, in PD patients only (p = .03).

Conclusions: The degree of cognitive impairment and depression in patients with PD had a differential impact on patient and caregiver perceptions of behavioral symptoms. Cognition and mood were more strongly correlated with PD patient scores and currently perceived behavioral symptoms.

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K. DHIMA, L.S. HYNAN, J.R. JOHNSON, J. ROSSMANGO, S. MCCLINTOCK, R.B. DEWEY, D. GERMAN & L. LACRITZ. Does Tremor Type Matter? Rethinking the Traditional Tremor-Dominant vs. Postural Instability and Gait Difficulty Subtypes of Parkinson's Disease.

Objective: Among the most studied Parkinson's disease (PD) subtypes are patients with postural instability and gait difficulty (PIGD) versus tremor-dominant (TD) symptoms, which combines rest and action tremors despite their neurophysiological differences. This study examined differences at baseline (BL) and over time between TD and PIGD groups, and between comparable groups that used only rest tremor (RTD and PIGD).

Participants and Methods: 683 subjects with PD (TD/PIGD/intermediate N=426/175/82; RTD/PIGD/intermediate N=340/277/66) from the Parkinson's Progression Markers Initiative and the NINDS PD Biomarkers Program were assessed at BL and last visit (M=3.9 years later). One-way ANCOVAs compared demographic, motor, cognitive, psychiatric, behavioral, DaTscan, and biofluid variables between groups at BL and over time.

Results: Both tremor groups performed better than their relative PIGD groups at BL in non-motor and psychiatric symptoms, quality of life, daytime sleepiness, and in general PD burden at BL and over time. No other significant differences emerged between the TD/PIGD groups at BL or over time. However, relative to its PIGD group, the RTD group also displayed lower anxiety, fewer REM behavior disorder (RBD) symptoms, and greater DaTscan striatal binding at BL, as well as slower decline over time in attention and independence with activities of daily living (ADLs).

Conclusions: This study found that subtyping PD patients according to symptom predominance of postural instability/gait difficulty versus rest tremor only, instead of the traditional combination of rest and action tremors, yielded greater group differentiation. Observed differences in anxiety, RBD, DaTscan, and rate of decline in attention and independence with ADLs supports the separation of rest and action tremors in future PD subtyping efforts. However, further research is warranted to assess this subtyping paradigm's utility, as insignificant group differences in symptoms and trajectories that are known to be meaningful in PD suggest limitations.

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O. BEZDICEK, D.J. LIBON, M. LAMAR, F. RUZICKA, J. ROTH & R. JECH. Serial Order Recall in Working Memory Across the Cognition Spectrum of Parkinson Disease.

Objective: We aimed at showing that the frontostriatal dysfunction in Parkinson disease (PD) with normal cognition (PD-NC) in ON state (with a stable L-Dopa medication) would lead to greater SERIAL ORDER (working memory) than ANY ORDER (auditory span) impairment in verbal WM of PD-NC. Furthermore, we aimed to prove that these deficits are more pronounced in a pre-dementia state such as PD with mild cognitive impairment (PD-MCI).

Participants and Methods: The 160 PD patients in this study were diagnosed as having idiopathic PD according to UKPDSBB criteria (Hughes et al., 1992) and classified as PD-MCI (n=87; mean age 61.49±8.66; mean education 13.63±3.05) and PD with normal cognition (PD-NC; n=72; 58.03±9.01; 14.60±2.79) according to Level I, IPMDS criteria (Litvan et al., 2012). We included also a control sample (n=71; 60.38±11.21; 14.56±2.70). All participants were assessed with Backward Digit Task (BDT; Lamar et al., 2007). BDT consists of seven trials of 3-, 4- and 5-digit span lengths verbally presented by the examiner and repeated in reverse order by the participant. The dependent variable, percent correct in SERIAL-ORDER (SER) has been shown to rely on accurate serial position recall, whereas correct in ANY-ORDER (ANY) relies on recall of presented digits regardless of serial placement. We analyzed the results by two-way MANOVA and adopted a significance level α=.05.

Results: There was a trend towards worsening performance with rising WM difficulty, especially in PD-MCI vs. PD-NC (3-Span ANY p=.968 vs. 3-Span SER p <.001; 4-Span ANY p=.486; 4-Span SER p=.251; 5-Span ANY p=.010; 5-Span SER p<.001) with greater impairment of SER condition (serial recall).

Conclusions: We present evidence towards a greater impairment of verbal WM in serial recall rather than free recall. We hypothesize that more pronounced impairment in WM of PD-MCI in comparison to PD-NC is caused by a higher affliction of frontostriatal networks.

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L.E. COLVIN, S. CHAPMAN, T.E.K. CERSONSKY, M. AZAR, S. KELLNER, E.D. LOUIS, E.D. HUEY & S. COSENTINO. Psychological Factors and Neural Substrates Associated with Metacognition among Older Adults with Essential Tremor.

Objective: Disordered metacognition has significant functional implications. Older adults with Essential Tremor (OA-ET) are vulnerable to cognitive decline and may be unaware of such changes. The bases of disordered awareness in this population are unknown and could reflect premorbid and/or disease-related factors. We examined 1) whether psychological characteristics are associated with metacognitive impairment (MI), and 2) whether ET-specific pathologies (ETP) or comorbid, neuropathological changes associated with Alzheimer's disease (NP-AD) better explain variability in awareness.

Participants and Methods: We utilized Latent Class Analysis (LCA) to test for discrete personality (NEOFFI) and mood (GAD-7/GDS) classes among 223 OA-ET (ages 65-97). ANCOVA was used to examine whether awareness of memory, language, and executive functioning differed across the emergent classes, covarying for demographics. Postmortem evaluations were utilized to examine whether ETP or NP-AD are associated with MI among 21 OA-ET (73-94).

Results: Two classes emerged in the LCA: Class A was characterized by predominantly high Neuroticism, Anxiety, and Depression (NAD); Class B by predominantly low NAD. Accuracy of awareness across cognitive domain did not differ as a function of class membership. Mann-Whitney U Tests revealed that morphological hallmarks of AD (e.g. midtemporal lobe NFTs^{A}, Aβ^{B}, and cerebral amyloid angiopathy^{C}) rather than ETP were inversely associated with awareness, U^{A} = 67, p =.009, r =0.59; U^{B} = 66.5, p =.018, r = -0.28; U^{C} =63.5, p =.025, r =0.49

Conclusions: Contrary to previous findings in the general population (Colvin et al., 2018), these data suggest that in a neurologic population of OA-ET, mood and personality factors are not associated with metacognitive abilities; rather, lower metacognition was associated with pathological biomarkers of AD. Future research should continue to employ a biopsychological approach to awareness to improve conceptualization, assessment, and treatment of metacognitive disturbance.

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J. HELCER-BECKER, E. MELTZER & P.J. MATTIS. The Relationship Between FDG-PET Disease-Specific Biomarkers and Recognition Memory in Patients with Parkinson's Disease.

Objective: One of the distinguishing features between the subcortical dementias, such as Parkinson's disease (PD), and cortical dementias, such as Alzheimer's disease (AD), is the relatively intact recognition memory in patients with primarily subcortical disorders. Although PD is considered one of the subcortical dementias, autopsy studies have shown that PD patients often have AD pathology. We have previously shown that in PD, performance on the Brief Visual Memory Test-R recognition discrimination (BVMT-RD) is not associated with PD motor symptoms, but rather is related to generalized cognitive decline. We hypothesized that BVMT-RD performance may be sensitive to non-PD pathology in patients with PD. The current study investigates the relationship between BVMT-RD, and two FDG-PET biomarkers sensitive to cognitive functioning in patients with PD (PDCP) and AD (ADRP). We hypothesized BVMT-RD scores would be associated with ADRP activity, and not PDCP.

Participants and Methods: Fifty participants (M age= 62.9 ± 8.01, 22% female), completed a neuropsychological assessment battery that included the BVMT-R and California Verbal Learning Test-II (CVLT-II).

Results: Results indicated that BVMT-RD was negatively correlated with ADRP (Spearman r = -0.28, p = 0.046) but not PDCP (Spearman r = -0.195, p = 0.17). In contrast, recognition discrimination on the CVLT-II did not correlate with PDCP or ADRP (p > 0.05). Further, when dichotomized, patients who made errors on BVMT-RD exhibited greater ADRP expression (t = -2.27, p = 0.028) but not PDCP expression (t = -1.33, p = 0.19).

Conclusions: Overall, our research showed that performance on BVMT-RD is associated with expression of an FDG-PET metabolic network highly related to AD, but was not related to a PD specific cognitive network. Although further investigation is needed, given this finding, we suggest that in PD, BVMT-RD may help gain insight into the contribution of non-PD pathology to cognitive functioning.

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K. HANSON, A. ABBOTT, F. PONCE, H. SHILL, S. ORAVIVATTANAKUL, G. MOGUEL-COBOS, N. SALINS, A. LIEBERMAN & A. TRÖSTER. Impulse Control Disorders in Parkinson's Disease Before and After Deep Brain Stimulation.

Objective: To elucidate patient characteristics associated with the presence of impulse control disorders (ICDs) in Parkinson's disease (PD) before and after deep brain stimulation (DBS).

Participants and Methods: 84 patients (58 males/26 females) with PD were identified who underwent uni- or bilateral STN (n=52) or pallidal (GPi; n=32) DBS who completed neuropsychological evaluations before and after DBS. ANOVAs and Chi-square tests were conducted to identify characteristics associated with the presence of self-reported ICD symptoms in patients before and after DBS. Multiple regression

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and ANOVA were used to investigate the relationship between ICDs and self-reported levels of apathy.
Results: Men were more likely to have elevated ICD symptoms prior to DBS (Chi-square $p<0.01$) and to experience resolution of ICD symptoms post DBS whereas women were more likely to develop de novo ICD symptoms post DBS (Chi-square $p<0.01$). Those who experienced a resolution of one or more ICD symptoms post DBS had the youngest age of onset of PD symptoms (average age=48.0 years) whereas those who had elevated ICD symptoms pre- and post-DBS had the oldest age of onset of PD symptoms (average age=58.9; $F=3.66$, $p<0.02$) and greater levels of apathy at baseline ($F=4.90$, $p<0.01$). ICD symptoms at baseline were positively correlated with elevated symptoms of apathy both pre- ($R^2=0.18$, $F=17.46$, $p<0.01$) and post-DBS ($R^2=0.10$, $F=9.18$, $p<0.01$).
Conclusions: Gender and age of onset of motor symptoms differentially relate to presence of ICDs pre- and post-DBS. While sometimes described as opposite ends of a spectrum of hyper and hypodopaminergic states, apathy and ICDs co-occur in some PD patients. The relationship between patient use of dopamine agonists and development of symptoms of apathy and ICD needs to be further investigated.
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Plenary F (Birch Memorial Lecture) Just Babies: The Origins of Good and Evil

Presenter: Paul Bloom

5:00–6:00 p.m.

P. BLOOM. Just Babies: The Origins of Good and Evil.
Babies possess a rich moral sense--they distinguish between good and bad acts and prefer good characters over bad ones. They feel pain at the pain of others, and might even possess a primitive sense of justice. But this moral sense is narrow. Many principles that are central to adult morality, such as kindness to strangers, are the product of our intelligence and our imagination; they are not in our genes. And some of our natural moral intuitions, having to do with purity, disgust, and even empathy, have perverse consequences—we would be better off without them. As a result of attending this lecture, participants will be able to (a) describe the moral powers—and limitations—of babies and toddlers and (b) discuss and critique how data and theory from developmental psychology bears on the fundamental debates about human nature.
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Panel Discussion Presented by the INS Student Liaison Committee: The Future of Neuropsychology: Diversity, Technology, and Staying Relevant

Moderator: Ann-Marie Raphail

Presenters: John Medaglia, Tania Giovannetti, Dawn Mechanic-Hamilton, Benjamin Hampstead, Beatriz MacDonald

6:00–7:30 p.m.

SATURDAY MORNING, FEBRUARY 23, 2019

CE Workshop 11. Disrupting Academic Communication: Creating Vivid, Engaging Access to- and Excitement About -our work as Neuropsychologists

Presenter: Karen Postal

7:20–8:50 a.m.

K. POSTAL. Disrupting Academic Communication: Creating Vivid, Engaging Access to- and Excitement About -our Work as Neuropsychologists.
How do we create access to complex, highly technical neuropsychological ideas for our colleagues, the broader research community, and the general public- in a way that is engaging, vivid, and (to quote Faulkner) sets the truth on fire?
The workshop is about disrupting the academic communication style we all learned in our years of scientific training that typically results in a net *loss* of our ability to communicate clearly and simply about the neuroscience we love. It is about shedding jargon, giving ourselves permission to allow emotion to creep back into our (written and spoken) language, translating numbers back into human terms, freeing up our body language, and using vivid, clear, language that allows us to create moments of genuine, productive communication as we present our work to colleagues at conferences, scientists/clinicians in other fields, legislators and grant reviewers who fund our work, and members of the general public. Material for the workshop is based on the qualitative research projects, *Testimony That Sticks, (*where psychologists, neuropsychologists, attorneys and judges weighed in about what makes outstanding communicators on the stand) as well as *Feedback That Sticks.*
Upon completion of this workshop, participants will be able to:
1. Revise their goals from *presenting* research to *creating moments of access and excitement* for their audiences, be it colleagues, the broader research community, or the general public
2. List specific ways that traditional academic communication patterns prevent others from accessing and getting excited about our research and ideas.
3. Describe and use several disruptive communication strategies to introduce into our writing and presentations that allow us to "set the truth on fire."
Correspondence: *Karen Postal, Ph.D, APBB-CN, Psychiatry, Harvard Medical School, 166 Main Street, Suite 3B, Andover, MA 01810, United States. E-mail: karenpostal@me.com*

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CE Workshop 12. Neuropsychology of Children Exposed to Heavy Metals: Assessment and Intervention to Improve Executive Functions

Presenter: Neander Abreu

Co-Presenter: Chrissie Carvalho

7:20–8:50 a.m.

N. ABREU & C. CARVALHO. Neuropsychology of Children Exposed to Heavy Metals: Assessment and Intervention to Improve Executive Functions.

Recent reports suggest that excessive exposure to heavy metal can lead to its accumulation in the brain with neurotoxic consequences. In children, elevated manganese, for example has been associated with deficits in certain neuropsychological domains such as intelligence, motor function, memory and attention, and in some instances, hyperactivity and behavioral problems. Thus, due to variety of neuropsychological consequences of exposure to heavy metals, it is very important to identify and assess these consequences adequately. There are many associated factors that can influence cognitive outcomes in children exposed to heavy metals including poor socioeconomic status (SES) and adverse environmental factors. As a result, it is crucial to choose neuropsychological instruments and tests that may address these factors. This CE course will focus in an approach to addressing these issues very common in developing countries and vulnerable children regardless of location. Furthermore, it will address intervention and strategies to improve executive functions in vulnerable children with heavy metal exposure. In sum, this workshop is designed to help you: 1) describe the neuropsychological effects of heavy metals exposure with a special focus on manganese; 2) recite the main tests ideal to assess children exposed to heavy metals and associated factors that should be considered when choosing your neuropsychological protocol; and 3) assess and utilize a new program, "The Heroes of the Mind", developed to stimulate executive functions in children with heavy metal exposure. Practical activities related to this program will be presented and attendees will be trained on this approach.

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Poster Session 9. Concussion/TBI Across the Lifespan

9:00–10:15 a.m.

Concussion/Mild TBI (Adult)

M. BEDARD, J. STEFFENER & V. TALER. Long-term impairment in executive functioning following mild traumatic brain injury with loss of consciousness.

Objective: Despite increasing attention being directed to understanding the neuropsychological sequelae of mild traumatic brain injury (mTBI), little is known about long-term outcomes. Indeed, it has been proposed that initial meta-analyses on this literature have obscured subgroups of individuals that may experience lasting impairments. Interestingly, burgeoning evidence from neuroimaging studies has identified structural and functional alterations to frontal lobe tracts years after mTBI. These frontal regions are associated with executive functions. The present study thus sought to identify whether impairments in executive functioning may persist long (1+ years) after mTBI.

Participants and Methods: Analyses were run on data from the Canadian Longitudinal Study on Aging (CLSA), a nationwide study of health and aging involving individuals between the ages of 45 and 85. Analyses were run on the 1,906 participants who experienced mTBI with loss of consciousness (LOC) more than 12 months prior, and the 13,311 cognitively healthy adults. Neuropsychological tests included the Rey Auditory Verbal Learning Test, Controlled Oral Word Association Test, Animal Fluency Test, Mental Alternation Test, and the Victoria Stroop Test.

Results: Those with mTBI were more likely to be impaired on single-test measures of verbal fluency and task switching than controls. When collapsing tests into executive functioning and episodic verbal memory domains, those with mTBI were also more likely to be impaired at the 1.5 SD cutoff on two or more within-domain tests of executive functioning relative to controls.

Conclusions: Impairments in executive functioning may persist in a subgroup of individuals long after mTBI with loss of consciousness.

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S. BELKONEN, K. RHYNER, D. MCKAY, N. CASSELL & B. SHENAL. Consistency of Symptom Report in Veterans with Mild Traumatic Brain Injury.

Objective: To examine the consistency of symptom reports of veterans who were seen for a Comprehensive Traumatic Brain Injury evaluation (CTBIE) at the Salem VA. Research has suggested a lack of consistent self-report of veteran's PTSD and TBI symptoms over time, as well as their report of current symptom level and functional abilities (Russo, Fingerhut, 2017). Colloquially, it was observed that veterans would report different symptoms and severity to different providers during the course of their evaluation in same visit. This study seeks to examine the consistency of patient report across measures completed during their CTBIE. It is also hypothesized that veteran's with a diagnosis of PTSD or TBI may be less consistent in their reports.

Participants and Methods: Participants included 317 veterans who completed the CTBIE in the Polytrauma Support Clinic (PSCT). A retrospective chart review was conducted to compare symptom report of veterans on the Neurobehavioral Symptom Inventory (NSI) and BDI-II. Seven items examining concentration, sleep, appetite, irritability, loss of energy, difficulty making decisions/indecisiveness, and feeling sad that are assessed on both measures were compared. Correlations were used to examine the relationship between the paired items. Fisher r-to-z transformation was used to determine significance between the correlations.

Results: Correlations between items ranged from 0.58 to 0.79, for all items except sleep (0.30-0.47). All correlations for each pair of items were significant ($p<.01$). The difference between correlations for report of sleep in veterans with and without PTSD was significant ($z=1.62$, $p<0.05$). The difference between correlations for report of appetite in veterans with and without TBI was significant ($z=2.14$, $p<0.01$).

Conclusions: Research suggests that self-report changes over time; however, this has not been examined when looking at self-report during the same visit. This study suggests that veteran's self-report of symptoms are relatively consistent within the same visit.

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L. BENNETT, S. STEPHEN, G. SHAN, C. BERNICK & S.J. BANKS. Differences in Cognition and Regional Brain Volume in Relation to Exposure to Professional Combat Sports.

Objective: Females experience higher frequencies of concussions across sports and endorse more concussion symptoms than their male counterparts. While structural brain changes and declines in cognitive performance are associated with repetitive head impacts (RHI), the role of sex is not yet well understood. This study aimed to determine if there is a differential effect of sex on cognitive functioning and brain region volumes in professional fighters.

Participants and Methods: 58 females from the Professional Fighters Brain Health Study were assessed via the CNS Vital Signs computerized cognitive battery and underwent structural brain imaging. Demographic

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data and fight exposure were also considered. To examine the relationship between regional brain volume, cognitive performance, number of professional fights (NoPF), and sex, female fighters were matched with male fighters on age, ethnicity, years of education, and type of fighting (e.g., boxing, MMA), and matched groups were compared via a 2 (group) by 21 analysis of covariance, accounting for total brain volume.

Results: Sex significantly moderated the relationship between NoPF and verbal memory (VM) performance, such that men had poorer VM performance. Similarly, sex moderated the relationship between NoPF and amygdala volume, such that left and right-sided amygdala volumes of male fighters were observed to have a stronger relationship with exposure as NoPF increased when compared with their female counterparts. Further, a trend toward significance was observed in the moderation relationships between NoPF and reaction time, right and left putamen, right hippocampus, and right thalamus volumes.

Conclusions: Sex was associated with important cognitive performance differences at baseline amongst professional fighters. Additionally, sex was an important moderator in the relationship between NoPF and brain volumes of numerous regions, suggesting that sex differences in neuroanatomic and cognitive response to RHI deserve further attention.

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A.S. BODAPATI, A. GIAMMITTORIO, N.J. PASTOREK, B. MILLER, A. SIM, J. LINCK & J. ROMESSER. Failure of one Performance Validity Test is Associated with Increased Likelihood of Failing Additional Performance Validity Tests in Individuals with a History of Mild Traumatic Brain Injury.

Objective: Performance validity tests (PVT) have become a significant component of neuropsychological evaluation. The general consensus is that two or more PVT failures are needed to reflect invalid performance. However, the characteristics of each PVT vary widely and as such, the failure of one PVT is not psychometrically equivalent to the failure of another. In some circumstances, failing one PVT may arguably provide very strong evidence of invalidity. This study explores the likelihood of additional failed PVTs following one PVT failure.

Participants and Methods: The study recruited 261 veterans with a history of traumatic brain injury who were referred for neuropsychological testing. They were administered a comprehensive battery, including several standalone [e.g, Test of Memory Malingering Trial 2 (TOMM2), Word Memory Test (WMT)] and embedded [e.g, California Verbal Learning Test-2nd Edition Forced Choice (FC)] PVTs. Failure in each PVT was analyzed to examine the odds of failing another PVT.

Results: There was a significant association between failing FC and failing another PVT, χ^2 (1) = 31.45, $p < .001$. Based on the odds ratio, the odds of failing another PVT after failing FC were 39.23 times higher than if they passed FC. There was also a significant association between failing TOMM2 and failing another PVT, χ^2 (1) = 39.46, $p < .001$. The odds of failing another PVT after failing TOMM2 were 26.95 times higher than if they passed TOMM2. Finally, there was also a significant association between failing WMT and failing another PVT, χ^2 (1) = 46.82, $p < .001$. The odds of failing another PVT after failing WMT were 7.64 times higher than if they passed WMT.

Conclusions: Data revealed that failing one PVT resulted in odds ratios of failing another PVT, ranging from 7.64-39.46. This suggest that in some circumstances, a second PVT may not be necessary to provide sufficient evidence of invalidity. In fact, strong predictive data such as this may serve as a second piece of evidence of performance invalidity.

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V.S. BROWN, H. BERTISCH, A. FUENTES, C.B. SCHOEN, C. MORTON, Y. LUI & J.F. RATH. Racial-Ethnic Differences in Self-Report on the Frontal Systems Behavior Scale Following Mild Traumatic Brain Injury.

Objective: According to the Health Belief Model (Hochbaum, 1958; Rosenstock, 1960), appraisal of medical conditions varies by racial-ethic (RE) background (Skinner, Tiro, & Champion, 2015). This discrepancy in appraisal is pertinent to self-reported symptoms following mild traumatic brain injury (mTBI). For example, processing speed is typically impacted following mTBI, but the speed at which cognitive tasks are completed is disproportionately valued among different races and ethnicities (Kennepohl, Shore, Nabors, & Hanks, 2004; Levine, 2018). Our objectives are to determine:

1) Racial-ethnic differences in self-appraisal of executive dysfunction after mTBI, as measured by the Frontal Systems Behavior Scale (FrSBE).

2) Associations between processing speed (PS) and self-appraisal.

Participants and Methods: Participants: Fifty-five outpatients with mTBI in a metropolitan hospital (61.8 % female) were tested: 32 identified as white, while 23 were people of color. Average age was 34.88 (*SD* = 12.22), with 15.95 (*SD* = 1.73) years of education.

Measures: The FrSBE was used to determine subjective change in executive function from pre- to post-injury. Composite Processing Speed Index was calculated via WAIS-IV Coding and Symbol Search scores.

Results: No significant relationships were found between the two racial-ethnic groups in terms of self-appraisal of executive dysfunction after injury. We found a significant relationship between greater negative self-appraisals and lower PS scores in the white individuals only ($p = .01$).

Conclusions: No significant differences were found in individuals' experience of mTBI symptoms by RE background. White individuals with lower PS reported greater symptoms, likely reflecting their greater value of PS. Our results have implications for improved understanding of subjective report of symptomatology by RE background, and should be considered during interpretation of test results and feedback.

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T.A. BUSCH, S. GREIF, G. HROMAS, C.E. DEMMING, A.M. SVINGOS, Z. HOUCK, S. DATTA, S.C. HEATON, M.S. JAFFEE & R. BAUER. The Correlation Between Sleep Disturbance and Headache Severity in Individuals With Persistent Post Concussive Symptoms.

Objective: Sleep disturbance and headache are common sequelae of head injury. The following study sought to investigate the relationship between sleep disturbance and headache in individuals with persistent post-concussion symptoms (i.e., >3 months).

Participants and Methods: Data were obtained from 52 individuals presenting to an interdisciplinary concussion clinic (19 male, *M* age = 40, *Median* days since injury = 273). Self-reported sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI; scale 0-21) and its components (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction [each 0-3]). Headache severity was assessed using the headache item from the SCAT 5 Symptom Evaluation (S5SE; scale of 0-6). Bivariate correlations were used to examine the relationships between PSQI global and component scores and SCAT-5 headache severity.

Results: Results indicate that increasing severity of global sleep quality is associated with increased headache severity ($r = .342$, $p < .05$). Further investigation of sub-components of sleep quality revealed that sleep disturbance ($r = .385$, $p < .01$) and sleep latency ($r = .311$, $p < .05$) were both positively correlated with headache severity.

Conclusions: The current study suggests that increasing severity of self-reported headache is associated with an increased report of global sleep difficulties, especially sleep disturbance and sleep latency, in

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patients with persistent post-concussion symptoms. Future research should investigate the temporal order of symptom onset. A more thorough understanding of this relationship would allow clinicians to provide more targeted treatments for these common problems after a concussion.
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C. COOK & J. SUHR. Relationship of Mild Traumatic Brain Injury (mTBI) Information to Illness Beliefs in Individuals with High Health Anxiety.

Objective: Individuals with a history of mTBI often use information from the media to form beliefs about their injury and expected recovery. Individuals who form erroneous beliefs may be at increased risk of experiencing persistent symptoms after mTBI; individuals high in health anxiety may be at even greater risk. We investigated whether reading different media information about mTBI symptoms would be related to mTBI illness beliefs in individuals with high health anxiety.

Participants and Methods: Participants were selected from a larger study (n=286) of U.S. residents over 18 who endorsed prior history of mTBI. Only participants who scored above the 70th percentile on a measure of health anxiety were included (n=78). Mean age was 35.4, 43.6 percent were males, and 69.2% were white. Measures of interest included the Whiteley-7, designed to assess health anxiety, the Illness Perceptions Questionnaire-Revised (IPQ-R), which assesses health beliefs related to mTBI, and a measure of Cogniphobia (fear that cognitive exertion will exacerbate symptoms or be dangerous). Participants read one of four articles, stating that symptoms of mTBI are: severe and long-lasting, severe but not long-lasting, mild but long-lasting, or mild and not long-lasting.

Results: Individuals in the severe/short group reported significantly more Cogniphobia than individuals in the mild/long (p = .045) and mild/short (p = .005) groups. Individuals in the severe/short group also reported stronger belief that treatment will be ineffective (IPQ-R Treatment Control) and stronger believe that they have no personal control over their symptoms (IPQ-R Personal Control) than individuals in the severe/long or mild/short groups (p = .009 to .023).

Conclusions: Results demonstrate the potential impact of mTBI misinformation on illness beliefs. Overall, results suggest individuals with high health anxiety who read that mTBI symptoms are severe may be more likely to develop negative mTBI beliefs, which may put them at increased risk for persistent symptoms.
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A. DACOSTA, N. NORHEIM, L. GOWOROWSKI, K. GRUENINGER & F. WEBBE. Scores on Sports Motivation Scale Remain Stable from Baseline Through Concussion Recovery in Collegiate Athletes.

Objective: Previous research suggests that athletes experience an increase in motivation at post-concussion evaluations when compared to baseline (Rabinowitz et al., 2015). One conjecture about such a change is that athletes are aware that their post-injury test results will be used to inform return-to-play decisions, in turn providing a powerful incentive for optimal performance (Rabinowitz et al., 2015).

Participants and Methods: 26 college athletes (M = 19.11; SD = 1.3; 50% female) completed the Sports Motivation Scale-II (SMS) at pre-participation baseline, post-concussion evaluation, and follow-up. Repeated measures ANOVA was used to examine the six subscale scores as well as the Relative Autonomy Index (RAI) across baseline, post-trauma, and final follow-up.

Results: There was no statistically significant change in RAI across pre-injury baseline (M = 65.96, SD = 21.17), post-concussion (M = 64.23, SD = 21.44), and follow-up (M = 68.15, SD = 24.61) before returning to sport (*Wilks Lambda* = .945, F = .699, p = .51). Furthermore, there were no statistically significant changes in the six individual SMS subscales across concussion recovery periods.

Conclusions: Contrary to predictions made from previous research (Rabinowitz et al., 2015; Mallett et al., 2007), sports motivation as measured by the SMS II was invariant from baseline through post-trauma and follow-up measurements. However, the small sample size may be a limitation of the findings. Further research might examine differences in sports motivation in neuropsychological versus orthopedic injury, to further understand the psychological influences of injury on return to play in athletes.
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N.S. DAILEY, C.E. MEINHAUSEN & W.D. KILLGORE. Self-Initiated Recall Strategies in Mild Traumatic Brain Injury: Identifying the Neural Correlates.

Objective: In memory tasks, serial and semantic clustering are self-initiated recall strategies that can improve performance. Emerging evidence suggests adults with acute mild traumatic brain injury (mTBI) are more likely to use semantic clustering compared to adults with chronic mTBI. However, the neural mechanisms associated with recall strategies remain unknown. We hypothesized that white matter integrity and time since injury predict the use recall strategies.

Participants and Methods: Fifty-six adults participated, including 20 controls, 22 adults with acute mTBI (2-12weeks post-injury), and 15 adults with chronic mTBI (6-12months post-injury). Serial and semantic clustering was measured using the California Verbal Learning Test. The superior longitudinal fasciculus (SLF) and uncinate fasciculus (UF) were targeted using diffusion weighted imaging and measured by fractional anisotropy, mean diffusivity, radial diffusivity, and axial diffusivity. Separate stepwise linear regressions were calculated to determine the relationship between white matter integrity and time since injury on the use of serial and semantic clustering.

Results: Fractional anisotropy in the left SLF (β=-.28, p=.03) and axial diffusivity in the right UF (β=.25, p=.05) significantly predicted serial clustering, accounting for 16% of the total variance (p<.05). In contrast, fractional anisotropy in the left UF (β=.30, p=.03) significantly predicted semantic clustering, accounting for 9% of the total variance (p<.05). Finally, contrary to our hypothesis, time since injury was not a significant predictor of recall strategy.

Conclusions: Serial clustering is associated with reduced white matter integrity in the left SLF, and increased integrity in the right UF, whereas semantic clustering is associated with increased integrity in the left UF. Adults who utilize serial clustering may exhibit disrupted axonal integrity within left-lateralized language pathways, impeding their ability to use a higher-level recall strategy, such as semantic clustering.
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S.N. ROLIN, R.M. PELO, K. BLACK-BAIN, K.K. TUCKER, K.A. JOHNSON-CRITCHFIELD, A. WALLACE, J. DAVIS & C.M. MULLEN. Baseline Endorsement on the Post-Concussion Scale in College Athletes.

Objective: Concussion protocols often include symptom scales. This project examined baseline symptom endorsement in college athletes.

Participants and Methods: Participants (N = 129; 45% female; age 18-25) were members of men's and women's lacrosse and rugby and men's soccer teams who underwent baseline evaluation as part of a clinical concussion management protocol. None of the participants were symptomatic from a prior concussion at baseline evaluation. Data were examined retrospectively. The primary outcome measure was the Post-Concussion Scale (PCS; Lovell et al., 2006), a 22-item self-report inventory of post-concussive symptoms. PCS total raw and

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norm-referenced z-scores were examined. Item level responses were scored according to diagnostic criteria for post-concussion syndrome. Non-parametric analyses were used given the distribution of PCS raw scores.
Results: PCS raw scores were significantly different between female (Mdn = 5; M = 8.0, SD = 8.8) and male (Mdn = 2; M = 4.5, SD = 7.3) athletes (p = .003). Twelve percent of female athletes produced elevated baseline norm-referenced scores (z ≥ 1), and 11% of male athletes scored in that range. The majority of participants (62%) had no prior concussion history; 17% had one prior concussion; and 21% had two or more prior concussions. Concussion history was not associated with PCS score (rho = .14, p = .13) or gender (rho = .07, p = .43). Four participants met diagnostic criteria for post-concussion syndrome at baseline (3 females; 1 male); two of the four athletes endorsed a history of psychopathology.
Conclusions: Elevated scores on post-concussion symptom measures are not uncommon among athletes at baseline with higher endorsement by female athletes. Return-to-play protocols will be optimized by considering symptom reporting of each player rather than generic cutoffs. Cutoffs may be improved by developing gender and team specific norms. Cases meeting diagnostic criteria for post-concussion syndrome illustrate the non-specific nature of the diagnosis.
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K. DELL, W. CARR, A. YARNELL, E. POLEJAEVA & G. KAMIMORI. Examining Headache & Postural Control Variability in Serial Blast-Related Training Exposure.
Objective: Military service members chronically exposed to low-level blast through explosive breacher training report symptoms consistent with TBI, especially headache, compared to non-breaching service members[2] or to service members with less exposure[5]. Deficits in postural control have been reported previously both in blast-exposed service members[3] and in concussed athletes reporting posttraumatic headache[4]. We examined overlap in headache and postural control among blast-exposed service members.
Participants and Methods: Carr et al. 2015[1] completed a systematic observation of service members in a 2-week explosive breaching training at 3 sites. Center of pressure (COP) data, an indicator of balance/stability, and symptom self-report were collected at baseline and on each training day, regardless of blast exposure. COP was assessed in 4 conditions: eyes open and eyes closed, on firm surface and on foam surface. We examined change in sway values (postural control) in the eyes-closed, foam surface condition at baseline and each day of training. Mean change score values from baseline sway values were calculated and were correlated with mean symptom report values for headache.
Results: Results (N=32) show a linear increase in mean change of sway from baseline following blast exposure, with the largest increase in mean sway after the largest blast (Day 7). Mean change scores correlated with headache following blast, $r = 0.57$, but were not predictive of headache on days when there was no blast exposure, $r = -0.24$. After Day 7, mean change in sway decreased, suggesting recovery of sway deficits as training concluded and blast exposure diminished.
Conclusions: The observed changes in sway following blast and correlation with increased report of headache converge with prior findings of increased symptomology in military populations repeatedly exposed to blast[2]. We present non-linear analyses to augment detection of subtle effects of blast on complex systems such as those involved in postural control.
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E.L. DUCCA, R. WELLINGTON & R. WISEHEART. Effects of balance on concussion history in student-athletes with learning disability and ADHD.
Objective: Students with Learning Disabilities (LD) and Attention Deficit/Hyperactivity Disorder (ADHD) are more likely to sustain multiple concussions and have poorer balance compared to neurotypical peers. However, the relationship between balance and concussion risk in these subgroups has not been adequately explored. The purpose of this study was to examine the relative contribution of balance on concussion risk in student-athletes with and without self-reported LD/ADHD.
Participants and Methods: This study used a retrospective cohort design. Participants were 299 student-athletes from an American NCAA Division 1 university. Predictors were archival data collected between 2012 and 2017 during preseason baseline assessment and included demographics from the Immediate Post-concussion Assessment and Cognitive Test (ImPACT) and Balance Error Scoring System (BESS).
Results: Consistent with previous research, athletes with LD/ADHD were more likely than controls to report a history of one or more concussions, $\chi^2(1)=5.18$, $p=.023$. Among those with positive concussion history, the number of concussions reported by the LD/ADHD group was slightly higher than controls and this difference approached significance, $U=2174$, $z=-1.94$, $p=.053$. The LD/ADHD group also performed more poorly than controls on the BESS, but this difference was not statistically significant, $U=4327.5$, $z=-0.84$, $p=.402$. A binary logistic regression confirmed that LD/ADHD status significantly predicted concussion history $\chi^2(1)=4.71$, $p=.030$. Adding BESS data to the model did not improve fit $\chi^2(2)=5.48$, $p=.065$, McFadden $R^2=0.02$.
Conclusions: These preliminary findings confirm that LD/ADHD increases concussion risk, but this association does not appear to be related to balance as tested on the BESS. However, it should be noted that these commonly employed measures of balance and LD/ADHD diagnosis are subjective and their reliability is questionable. Further research using more reliable measures is warranted.
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S. ESBIT, N.S. DAILEY & W.D. KILLGORE. Making a List and Checking it Twice: Episodic Verbal Recall in Mild Traumatic Brain Injury.
Objective: Mild traumatic brain injury (mTBI) can subtly change brain structure resulting in symptoms, such as memory deficits. Impaired cognitive functioning is frequently reported after a mTBI; however, little is known about the timeline for recovery. This study aims to assess recall strategies in acute and chronic stages of mTBI recovery. We predicted poor verbal recall for those with mTBI relative to healthy controls (HCs). We hypothesized that adults in the acute recovery stage (i.e. 1-month or less post-injury) would exhibit greater verbal recall, compared to adults in the chronic recovery stage (i.e. 6-months to 1-year post-injury).
Participants and Methods: Sixty adults completed the study, including 22 HCs (M_{age} = 22.97; SD = 3.38), 18 adults in the acute mTBI group (M_{age}=24.43; SD=7.59) and 20 adults in the chronic mTBI group (M_{age}=23.37; SD=5.25). Trials 1-5 of the California Verbal Learning Test (CVLT) were used to assess episodic verbal recall strategies. Percentage of correct words recalled from the beginning (RfP), middle (RfM), and end (RfR) of the list was measured for each group.
Results: The three groups did not significantly differ on age, gender, or IQ. There was a significant main effect of group on RfM ($F(2,59)=4.87$; $p=0.011$; $\eta^2=0.15$), but not RfP ($F(2,59)=2.69$; $p=0.076$; $\eta^2=0.09$) or RfR ($F(2,59)=1.939$; $p=0.153$; $\eta^2=0.06$). Post-hoc analyses showed that RfM was significantly reduced in chronic mTBI (M=42.10, SD=5.88), compared to acute mTBI (M=47.00; SD=4.34) (p < .05). RfM was not significant between adults in the acute compared to HCs nor between the chronic mTBI and HC groups.
Conclusions: Our results show that adults in the chronic recovery phase displayed lower RfM relative to those in the acute recovery. Contrary to our hypotheses, none of the groups differed in terms of RfP or RfR. Proactive and retroactive interference can impede consolidation of words

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from the middle of the list, suggesting adults in the chronic recovery stage may be more vulnerable to inference effects.
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A.I. FORD, N. GERSBACK, D. HOGG, M. FARABOUGH, J. CRAWFORD & A. MAZUR-MOSIEWCZ. A Systematic Review of Treatments for Psychiatric Symptoms of Mild Traumatic Brain Injury.

Objective: To review the evidenced-based research on the treatment of psychiatric symptoms associated with mild traumatic brain injury (mTBI).

Participants and Methods: This systematic review followed the PRISMA procedural guidelines. A highly-sensitive search of PubMed, EMBASE, Web of Science, PsycINFO, and ClinicalTrials.gov was executed. Results were limited to articles published in English between 01/96 and 03/18. The search strings used combinations of both controlled and uncontrolled vocabularies with high-yield keywords related to the effectiveness and average effect size for psychological or medication treatment for individuals displaying psychological/psychiatric post-concussive symptoms.

Results: Our searches retrieved a large number of false-positive results to ensure that important studies were not missed. After removing duplicates, the abstracts of 332 articles were reviewed. From this, a final group of 6 peer-reviewed original studies were identified. Three used psychotherapy interventions and 3 used medications. Quality ratings, using the Newcastle-Ottawa and Jadad scales for the final studies were also completed.

Conclusions: Clinical studies report relatively high rates of psychiatric diagnoses post-mTBI, from 21-34% and up to 50% in patients referred for neuopsychological evaluation, with the most common diagnoses being Major Depressive Disorder and Panic Disorder. Surprisingly, despite the high rates of psychiatric symptoms, there are only a handful of published studies that address treatment in mTBI populations. This systematic review found that there is initial indication that established treatments for primary depression and anxiety (e.g., Cognitive Behavioral Therapy, Cognitive Processing Therapy, pharmacotherapy) may also be effective in patients post-mTBI. However, due to the small number of original published research and their large variability in methods, there are no individual treatments that can be recommended as specifically effective in the treatment of mTBI psychiatric symptoms at this time.
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V.J. FRATZKE, R. RIEGER, K.J. WILSON, D. GILL, J.M. BROADWAY, J. CAVANAGH, R. CAMPBELL & R.A. YEO. Does the FrSBEsbe Account for Variance Above and Beyond Emotional Functioning in Semi-Acute Mild Traumatic Brain Injury?

Objective: Clinical evaluation of patients with Traumatic Brain Injury (TBI) requires tests of both cognitive and emotional function. The Frontal System Behavioral Scale (FrSBE) aims at a middle ground - self and other reports of executive functioning. Its role in assessment, and its relationship to common cognitive and emotional constructs, is not clear. Current research investigates the clinical utility of the FrSBE in the context of evaluation of EF function with a new battery, NIH Examiner.

Participants and Methods: 44 adults with recent mild TBI (age 18-55) were recruited within two weeks of their head injury. Participants completed NIH Examiner, which yields composite scores of Fluency, Cognitive Control, and Working Memory), the FrSBE (Ttotal "Aafter Iinjury" score), the Beck Depression Inventory-2, and PROMIS-29 Anxiety scores.

Results: In 3 hierarchical multiple regressions, predicting the 3 Examiner composites, depression and anxiety scores were entered at step 1 and FrSBE at step 2. For Working Memory, the R^2 change in step 1 was .072, a value that as not significant, indicating that depression and anxiety did not explain a significant proportion of variance of Working Memory. The inclusion of FrSBE Total Total AAfter Injury significantly increased the proportion of explained variance (p = .010). In contrast, for Fluency and Cognitive Control, depression and anxiety did not explain a significant proportion of the variance in step 1 and the FrSBE contribution was not significant for step 2.

Conclusions: Overall, the FrSBE was able to explain unique variance for performance on NIH Examiner for the Working Memory composite, but not fluency or cognitive control. These results highlight (1) the differential determinants of EF constructs, and (2) a valuable, but quite limited role for the FrSBE in evaluation of EF in mild TBI.
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K. GALLAGHER, T. AZUMA, K. INGRAM & C. BACON. Complex Verbal Working Memory in Military Veterans with and without mTBI.

Objective: Researchers have been investigating long-term cognitive symptom complaints associated with mild traumatic brain injury (mTBI) in military veterans (Storzbach et al., 2015). However, neuropsychological testing does not consistently reveal evidence of unremitting cognitive deficits related to mTBI. Tasks that tap into higher-order cognitive-linguistic functions, particularly those associated with frontal lobe networks, have been shown to be sensitive to diffuse neurological deficits related to mTBI (Barwood & Murdoch, 2013). The purpose of this study was to evaluate complex verbal working memory in veterans with and without a history of mTBI.

Participants and Methods: Participants included 58 military veteran college students recruited through the Pat Tillman Veterans Center at Arizona State University. All participants provided informed consent and completed an online questionnaire that included demographic and medical/vocational history questions, Memory Self Ratings, and the Beck Depression Inventory (BDI). A total of 22 veterans reported history of mTBI. All participants competed the Operation Span Task, a computerized complex verbal working memory task (Turner & Engle, 1989).

Results: Correlational analyses were used to examine the relationship between clinical conditions/self-ratings (mTBI, PTS, Memory Rating, BDI) and Operation Span Score (Span). The variables significantly correlated with Span (mTBI, BDI Score, and Memory Rating) were entered as predictor variables in a multiple linear regression. The regression model was significant (R^2_{adj} = .180, $F(3,53)$ =5.08, p =.004). Only mTBI significantly predicted lower Span (β= -.274, t= -2.17, p =.035).

Conclusions: Results provide evidence that complex verbal working memory may be vulnerable to long-term consequences of mTBI. Complex span task performance has been shown to predict a wide range of cognitive skills. Thus, working memory deficits may have broad implications for veterans with history of mTBI.
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V.T. GALLAGHER, J. STOCKS, N. KRAMER, B. VESCI, J. MJAANES, H. BREITER, Y. CHEN, A. HERROLD & J. REILLY. Eye Movement Performance and Associations with Clinical Outcomes in Female Athletes with Recent Mild Traumatic Brain Injury.

Objective: This pilot study aimed to evaluate reflexive and voluntary control of attention assessed by eye movement testing among collegiate female athletes with recent mild traumatic brain injury (mTBI) vs. non-injured control athletes (CON). Further, we aimed to evaluate whether eye movement performance is associated with post-injury clinical outcomes including symptom severity and length of recovery (LOR).

Participants and Methods: 12 female athletes with recent mTBI and 13 demographically matched CON were studied. mTBI athletes completed the Post-Concussion Symptom Scale (PCSS) within 72 hours

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of injury; eye movement testing was completed within ~ 1 week of injury. Testing included 1) a prosaccade task, a measure of reflexive attention requiring an eye movement to a visual target, and 2) an antisaccade task, a measure of voluntary attention requiring inhibition of an eye movement to a visual target and instead execution of a saccade in the opposite direction. Group differences and associations with clinical outcomes were evaluated with linear mixed effects modeling.
Results: On the prosaccade task, mTBI demonstrated faster latency, reduced accuracy, slower velocity, and longer duration of saccades compared to CON (ps<.001). On the antisaccade task, mTBI committed higher inhibitory errors (23.3%) vs. CON (14.5%) (OR = 1.593, p<.001). Among mTBI there was a trending association between faster prosaccade latency and antisaccade error rate (p=.084). Longer latency duration of prosaccades were associated with longer LOR and greater peak symptom severity (ps<.001).
Conclusions: This pilot study provides initial support for the use of eye movement testing to characterize differences between female athletes with recent mTBI and CON. Findings also demonstrate the potential utility of eye movement measures to account for variability in functional outcomes among athletes following mTBI.
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E.J. HARFMANN, H.A. PARKER, B. REMLER & T.A. HAMMEKE. Chronic mTBI predicts presence of retinal pathology: implications for assessment and management of posttraumatic visual distress and migraine.
Objective: To investigate the relationships among mTBI, retinal pathology, pattern-induced visual distress, and post-traumatic migraines.
Participants and Methods: 91 veterans and VA staff (Age $M = 33.1$, SD = 8.9). 67.0% had a history of mTBI. Time since last TBI ranged from 0 to 33 years ($M = 8.1$, SD = 6.7). The Neurobehavioral Symptom Inventory, a headache questionnaire, and a Visual Pattern Sensitivity Test (VPST) were given. The VPST has 20 high-contrast and 10 benign items. The VPST Distress scale applies a benign mean correction to remaining items to adjust for response bias. Retinal pathology was examined with Optical Coherence Tomography (OCT; OD = right eye, OS = left eye).
Results: 63.7% reported significant headaches. 62.6% reported photophobia with headache. VPST Distress correlated with headaches ($r = .48$, $p < .001$), TBI status ($r = .21$, $p = .045$), and subjective photophobia ($r = .32$, $p = .002$). Clinically significant OCT abnormalities (normative scores < 1st percentile) were found in the retinal nerve fiber layer (RNFL), combined ganglion cell and inner plexiform layer (GCLIPL), and minimum GCLIPL thickness only in the mTBI group. Chi-square analyses were used to compare OCT scores < 5th percentile by TBI status and OD RNFL ($p = .015$), OD GCLIPL ($p = .015$), and OS GCLIPL ($p = .042$) differed significantly by group (Cramer's V = .17 – .21). The frequency of OCT abnormalities was significantly higher than expected in the TBI positive and lower than expected in the TBI negative group.
Conclusions: MTBI status predicts some retinal pathology, with clinically significant findings occurring exclusively in individuals with mTBI history. These findings highlight that head trauma may impart risk for retinal pathology and possibly heighten the risk of visual distress and posttraumatic migraines for some persons, due to peripheral and/or central brain injury mechanisms. This novel study challenges common conceptions of mild head injury as ubiquitously involving complete recoveries and identifies areas for ongoing research.
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K.A. HOLIDAY, L.T. EYLER, S.F. SORG, A.L. CLARK, V. MERRITT, L. DELANO-WOOD & D. SCHIEHSER. Neural Activation During a Working Memory Task in Mild to Moderate Traumatic Brain Injury.
Objective: There is conflicting evidence regarding the impairment of working memory (WM) in individuals with mild to moderate Traumatic Brain Injury (mmTBI). In fact, many studies fail to detect group differences in WM task performance between individuals with TBI and healthy controls. Several studies have suggested that underlying compensatory neural mechanisms may explain adequate task performance in the context of abnormal brain activity in TBI. It is also possible that failure to detect WM impairment in mmTBI may be due to the utilization of WM measures with low cognitive demand. Thus, the objective of this study was to examine the neural activation and performance on a cognitively demanding WM task in mmTBI.
Participants and Methods: Sixty-three veterans with mmTBI and 32 veteran controls (VC) participated in a visually modified Paced Auditory Serial Addition Task (mPASAT), a cognitively demanding WM task, while undergoing event-related fMRI. Changes from baseline in the blood oxygen-level dependent signal during the correct minus incorrect trials were calculated at each voxel and maps were compared between groups with independent sample t-tests.
Results: The mmTBI veterans performed significantly worse than VC on the WM task (p=.035). VC exhibited greater activation in the bilateral inferior frontal gyrus, right superior frontal gyrus, right middle frontal gyrus, and right cingulate gyrus during the task compared to mmTBI veterans (all p's < .05).
Conclusions: WM, as measured by the mPASAT, is impaired in mmTBI Veterans compared to VC. Furthermore, mmTBI Veterans exhibited difficulty activating the bilateral inferior frontal gyrus, right superior frontal gyrus, right middle frontal gyrus, and right cingulate gyrus. These findings suggest that mmTBI may disrupt brain function necessary for adequate WM performance.
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Z. HOUCK, G. HROMAS, S. GREIF, A.M. SVINGOS & R. BAUER. The Relationship between Subjective Cognitive Symptoms and Objective Neurocognitive Functioning in a Concussed Sample Presenting to a Specialty Clinic.
Objective: To assess the relationship between cognitive functioning and cognitive symptom severity following concussion.
Participants and Methods: Data were obtained from 66 participants (61% female; median age=26.5 years; median days since injury=70.5) that presented to an interdisciplinary concussion clinic. Cognitive symptoms – difficulty concentrating, difficulty remembering, feeling slowed down, and feeling "in a fog" – were obtained from the SCAT3 symptom evaluation (S3SE) and summed for a cognitive symptom severity score (range, 0-24). Four cognitive symptom severity groups – none, mild, moderate, and severe - were determined by percentiles (33rd and 67th) based on frequency distributions. Neurocognitive functioning was measured using CNS Vital Signs multiple test domain scores: neurocognitive index, memory composite, psychomotor speed, complex attention, and cognitive flexibility. Chi-square and ANOVA's were used to assess for group differences among demographic and injury factors, as well as scores on mood and sleep measures. A multivariate analysis of covariance was used to assess the relationship between group and neurocognitive functioning. Factors significantly different between groups were included as covariates in the model.
Results: Cut points of the 33rd and 67th percentile corresponded with cognitive symptom severity of 3 and 11, respectively. Group differences were found among gender (p=.034), anxiety scores (p=.001), depression scores (p<.001), sleep quality (p=.035) and daytime sleepiness (p=.001). Prior to covariate inclusion, severe cognitive symptoms were associated with lower psychomotor speed scores when compared

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to participants with mild cognitive symptoms (p=.019). However, there was no main effect of symptom severity group across domains when covariates were included.
Conclusions: The relationship between psychomotor speed and cognitive symptom severity was fully mediated by gender, mood disturbance, and poor sleep.
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G. HROMAS, S. GREIF, C.E. DEMMING, A.M. SVINGOS, Z. HOUCK, M.S. JAFFEE, S.C. HEATON & R. BAUER. Demographic and Comorbidity Influences on CNS Vital Signs Performance in a Persistent Post-Concussion Population.
Objective: CNS Vital Signs (CNSVS) is a commonly used cognitive screener, which uses age norms only. It is largely unknown whether education level, gender, psychological symptoms (e.g., depression and anxiety), or poor sleep quality also affect performance on this measure.
Participants and Methods: 90 participants (39 male, M_{age} = 34; $M_{education}$ = 14, 6-20 years; median days post-injury = 94) underwent a brief neuropsychological screen using the CNSVS core test battery as part of an interdisciplinary TBI clinic evaluation for persistent post-concussion symptoms. Self-reported sleep and psychological functioning were measured via GAD-7, PHQ-9, and PSQI. Linear regressions and MANOVA's were used to assess for relationship between education, psychological symptoms, sleep impairment, and gender on multi-test domain scores.
Results: Linear regressions failed to reveal a relationship between education level and cognitive performance. Higher levels of anxiety, depression, and sleep impairment were associated with slower reaction time scores on a Stroop task (all $p < .01$). Higher level of sleep impairment was also related to slower reaction time on a continuous attention task (p=.033). MANOVA results indicated gender differences in performance on several measures, with females performing worse on measures of psychomotor speed, executive functioning, and finger tapping (all $p < .05$).
Conclusions: Several CNSVS subtests are influenced by psychological symptoms, poor sleep quality, and gender. As is the case in standard neuropsychological testing, gender appears to play a significant role in test performance and should be considered when interpreting test scores. The relationships among poor sleep quality, psychological symptoms, and test performance are consistent with previous findings and should also be considered qualitatively when interpreting results. Furthermore, cognitive screening devices for post-TBI symptoms should consider including expanded normative reference groups to increase utility and accuracy.
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S. JURICK, S. HOFFMAN, N.D. EVANGELISTA, A. KELLER, M.SANDERSON-CIMINO, K.J.BANGEN, S.SORG, L.DELANO-WOOD & A. JAK. History and number of blast exposures are related to myelin water fraction in OEF/OIF Veterans.
Objective: There is accumulating evidence that traumatic brain injury (TBI) resultant from blast exposure is associated withreduced white matter integrity. However, the role of myelin water fraction (MWF), an in vivo marker of myelin integrity, has not been evaluated. This study examined the relationship between blast-related mild and moderate TBI and MWF.
Participants and Methods: All participants underwent comprehensive neuropsychological testing and magnetic resonance imaging (MRI) including multicomponent driven equilibrium single pulse observation of T1 and T2 (mcDESPOT), which was used to quantify MWF in brain regions of interest (ROI). Participants included 78 Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) Veterans with history of combat exposure (n = 32 with no history of TBI, n = 42 with history of mild TBI, and n = 4 with history of moderate TBI).
Results: There were no group differences in MWF. When collapsing across groups, participants with history of blast-related TBI had significantly higher MWF in the corona radiata, internal capsule, and corpus callosum (all p's < .05). Additionally, number of blast exposures that resulted in TBI were significantly and positively associated with MWF across the same ROIs (all p's < .05). The vast majority of these relationships remained significant once controlling for symptoms of post-traumatic stress disorder and depression, and when excluding those with history of moderate TBI.
Conclusions: Participants with history of TBI due to blast exposure and multiple blast-related TBIs had higher MWF than those without, even when controlling for psychiatric symptoms. Previous preclinical research suggest a pattern of redundant remyelination after TBI that consists of smaller axons, which may account for higher MWF. This study adds to the growing literature supporting changes in white matter integrity following blast-related mild and moderate TBI, as well as provides preliminary support for myelin-specific changes.
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W. KILLGORE, J. VANUK & S. BAJAJ. Improving Executive Functioning in Mild Traumatic Brain Injury with Daily Morning Blue Light Therapy.
Objective: Mild traumatic brain injury (mTBI) can disrupt mood, sleep, and cognition, but no reliable and effective treatments for post-concussive symptoms have been developed. Emerging evidence suggests that blue wavelength light may re-entrain the circadian rhythm, thus leading to improved sleep and recovery following mTBI. We hypothesized that daily morning exposure to blue-wavelength light would therefore improve executive functioning.
Participants and Methods: Patients with an mTBI in the past 18 months (15 male; 16 female; Age=23.3, SD=7.2) were randomly assigned to receive 6-weeks of either blue (469 nm; n=16) or amber (478 nm; n=15) morning light therapy for 30-minutes daily. Baseline and post-treatment assessments, including the Tower of London (TOL), an executive function task requiring planning and sequencing, were completed at baseline and post-treatment.
Results: The primary outcome variable was throughput, a metric that accounts for time and accuracy (i.e., % Correct moves/average move time] x 0.60) and provides an output reflecting the number of correct bead placements per minute. We found a significant light condition x session interaction (p=.016). Overall, BLT led to a significant pre-to post-treatment increase in TOL throughput (p<.0001), but ALT showed no significant improvement (p=.094).
Conclusions: Daily morning blue-wavelength light exposure was associated with improved planning and sequencing ability compared to placebo, as indicated by the number of correct bead placements per unit of time. Growing evidence suggests that BLT can reduce fatigue, improve sleep timing, and facilitate brain repair processes among patients recovering from concussion. These preliminary findings suggest that blue light therapy may provide an easy to use and effective method for restoring some aspects of cognitive functioning following mTBI. Further work will be necessary to understand the causal mechanisms involved.
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K. LAPIRA, M. WERHANE, V. MERRITT, S.F. SORG, A. CLARK, M.J. WALSH, D.A. NATION, D.J. LIBON, M. BONDI & L. DELANO-WOOD. Elevated Pulse Pressure is Associated with Improved Inhibition-Switching Performance in APOE-ε4 Carriers with Mild Traumatic Brain Injury.

Objective: Although the APOE ε4 allele has been linked to poor cognitive outcomes in mild traumatic brain injury (mTBI), it remains unclear how this genotype might interact with vascular risk factors in the expression of outcomes following mTBI. Thus, we explored the independent and interactive effects of pulse pressure (PP) and APOE ε4 status (ε4 carriers vs. noncarriers) on executive functioning (EF) in Veterans with history of mTBI.

Participants and Methods: 99 Veterans (mean age: 32 years, range: 23-48; mTBI=58; Military Controls [MC]=41) underwent blood pressure (BP) assessment and genotyping, and completed a measure of EF (D-KEFS Color-Word Interference test [CWIT]). PP—a proxy for arterial stiffening—was derived from BP values (systolic - diastolic). Multiple linear regression was used to model associations between APOE ε4 status and PP on all 4 conditions of the CWIT (color reading, word reading, switching, and inhibition switching), adjusting for PTSD symptomology (PCL total score), premorbid functioning (WRAT4 Reading), and age of most severe TBI (mTBI group only).

Results: While PP and APOE ε4 status did not independently predict performance on any of the CWIT subtests in either group (all p's<.05), a significant APOE ε4 status x PP interaction was observed on the inhibition/switching condition within the mTBI group (p=.012). Specifically, elevated PP was associated with better inhibition/switching scores in ε4 carriers but not noncarriers. No significant interaction was observed in the MC group.

Conclusions: Results show that increased PP predicts better EF performance in individuals with mTBI who are APOE ε4 carriers but not noncarriers. Findings suggest that higher PP may have a protective effect in mTBI individuals at risk for dementia, at least at younger ages. These results add to a growing literature highlighting the complexity of vascular and genetic risk factors in outcomes following neurotrauma. Future research should explore how these effects may vary across the lifespan in those with a history of mTBI.

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B.G. LEE, L. BENNETT, C. BERNICK, G. SHAN & S.J. BANKS. Cognition, Depression, and Brain Volumes in Professional Boxers: Baseline and Longitudinal Data from the Professional Fighters Brain Health Study.

Objective: Depression, structural changes, and cognitive decline are often observed in those with repetitive head injuries (RHI). We examine whether a) clinically-significant levels of depression are associated with structural brain changes/cognitive performance, b) even minimal symptoms of depression moderate the relationship between RHI and regional brain volumes (RBV)/cognition, and c) baseline depression is associated with longitudinal cognitive changes.

Participants and Methods: 205 male boxers from the Professional Fighters Brain Health Study (PFBHS) completed the PHQ-9 depression questionnaire; were assessed via the CNS Vital Signs computerized cognitive battery; and underwent structural brain imaging. Participants were analyzed at first visit (whole sample) and longitudinally from first to most recent visit (subsample: n = 45; first visit – follow-up range = 1-6 years; mean = 2.61; SD = 1.09).

Results: Clinically-significant depression was associated with smaller RBV in the insula, cingulate, orbitofrontal cortex, thalami, and middle corpus-callosum sub-regions; and poorer verbal memory and psychomotor speed performance. Depression symptoms moderated the relationship between RHI and RBV in bilateral thalami, left hippocampus, left medial orbitofrontal cortex, and bilateral insulae but not cognition at baseline. Longitudinally, baseline depression was associated with declines in psychomotor speed and reaction time performance, and improvements in verbal memory performance. However, follow-up between-group analyses on an age-matched subsample of depressed versus non-depressed fighters revealed no meaningful differences.

Conclusions: Clinically significant depression was associated with structural and cognitive differences at baseline. Depression also moderated the relationship between RHI and RBV, suggesting its role as a marker for potential brain damage. Longitudinal changes in cognition were associated with baseline depression. The role of age and its association with fight exposure is important in this relationship.

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Y. LEE, Y. MATSUZAWA, P. UY, A. CHILDS, W. LU, C. BOUJAOUDE, W. BARR & J. RICKER. Clinical Validity of the MMPI-2-RF Cognitive Complaints Scale on Neuropsychological Evaluation with a Concussion Population.

Objective: The Minnesota Multiphasic Personality Inventory—2nd Edition-Restructured Form Cognitive Complaints (MMPI-2-RF COG) has been utilized to relate test takers' intellectual limitations and problems with attention, memory, and confusion (Ben-Porath & Tellegen, 2008). Research had suggested that the COG scale may not be significantly correlated with objective cognitive measures (Bolinger, Reese, Suhr, & Larrabee, 2014). However, data to suggest applicability to concussion population is limited. This study explored how well the objective neuropsychological measures predicted results of the COG scale among a concussion sample.

Participants and Methods: This retrospective study involved 109 adult concussion patients at an outpatient concussion center. Patients underwent a neuropsychological battery. Scores on the Wechsler Abbreviated Scale of Intelligence II, Wechsler Adult Intelligence Scale- 4th Edition Digit Span subtest, California Verbal Learning Test II, and MMPI-2-RF were examined. Failure on at least two performance validity tests and/or MMPI-2-RF TRIN-r and VRIN-r T scores above 80 was exclusion criteria.

Results: The MMPI-2-RF COG had a significant inverse association with intelligence (r = -.30), attention (r = -.19), short-term memory recall (r = -.38), and long-term memory recall (r = -.34). Selected cognitive measures accounted for 20% of the variance in the COG scale $F(7, 96) = 3.42$, $p < .01$, with the strongest prediction for intelligence (b = -.25). Crosstabulation analysis also indicated that 39% of those with elevated COG score had impaired performance on the long term memory recall.

Conclusions: Preliminary analysis demonstrated the MMPI-2-RF COG scale, to a certain extent, capture objective neuropsychological symptomology in a post-concussion population. However, a limitation is that individuals with elevated RBS and FBS-r were not accounted for. Further, among over-reporters, impact of factors on cognitive symptoms such as mood and litigation status should be explored.

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H.Y. LU, K. GICAS, P. LINDAHL, T. O'CONNOR, A. MEHTA, E. LIVINGSTON, J. STUBBS, A. JONES, T. BUCHANAN, W. HONER, A. THORNTON & W. PANENKA. Psychosis After Traumatic Brain Injury in Marginally Housed Individuals.

Objective: Individuals living in marginal housing experience high rates of traumatic brain injury (TBI) and psychosis. However, the association between acquiring a TBI and experiencing subsequent psychosis is unclear, as previous studies have been limited in the ability to establish a temporal sequence of events. The present study aimed to characterize acute changes in psychosis after TBI.

Participants and Methods: Participants with endemic rates of polysubstance use and psychiatric disorders were recruited from marginal housing sites, and were prospectively screened for TBIs and rated on severity of psychotic symptoms at monthly interviews. Current substance dependence diagnoses were determined prior to incident TBI.

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Sixty-four participants (44 male, M_{age} = 44.84) acquired a TBI. Logistic mixed effects models were used to explore trajectories of psychosis over a 6-month period (3 months pre-TBI and 3 months post-TBI). Exploratory analyses were then conducted to examine the effect of substance dependence diagnoses on differences in trajectories.

Results: Statistical analyses were adjusted for age and gender. Compared to the pre-TBI trend, there was not a significant change in odds of experiencing psychosis over time after TBI (OR = 0.93, 95% CI [0.81-1.06], p = 0.27). Age, gender, and severity of TBI did not moderate the relationship. Exploratory analyses revealed that cannabis dependence increased odds of psychosis over time after TBI (OR = 1.10, 95% CI [1.01-1.20], p = 0.04). Alcohol, crack or powder cocaine, methamphetamine, or opioid dependencies did not increase odds of psychosis after TBI.

Conclusions: Preliminary results from an ongoing study suggest that the sample generally did not exhibit an acute change in psychosis status within the first 3 months after TBI. However, certain factors such as cannabis dependence may increase vulnerability to developing psychosis following TBI. Further research over a longer follow-up period may be required to fully examine the effect of TBI on psychosis.

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D. MCKAY, B. SHENAL, S. BELKONEN & N. CASSELL. Prevalence of Traumatic Brain Injury, Post-Traumatic Stress Disorder, and Pain in a Sample of Rural Veterans Undergoing a Comprehensive Traumatic Brain Injury Evaluation.

Objective: Previous literature (Cifu et al., 2013) has examined prevalence rates of the polytrauma clinical triad ((traumatic brain injury (TBI), post-traumatic stress disorder (PTSD), and pain) in Veterans serving in Operation Iraqi Freedom/Operation Enduring Freedom/Operation New Dawn. The current study sought to expand on Cifu's work by examining the polytrauma clinical triad in a sample of rural Veterans who screened positive on the TBI Clinical Reminder and who completed a Comprehensive TBI Evaluation in the Polytrauma Support Clinic.

Participants and Methods: Participants included 243 Veterans from the Salem VA from 2009-2016. Descriptive statistics were used to calculate prevalence rates of Veterans with isolated diagnoses (e.g., pain only) or a combination of diagnoses (e.g., PTSD and TBI). Further, self-report prevalence rates regarding areas of and functional implication of pain were also calculated.

Results: The majority of the sample (87.2%) reported experiencing pain at the time of the evaluation while 64.2% were diagnosed with PTSD and 58.0% were diagnosed with TBI. In terms of multiple diagnoses, Veterans within the polytrauma triad group made up the largest portion of the sample (37.0%) followed by the combination of pain and PTSD (21.8%) and pain and TBI (14.4%). Within those experiencing pain, 84.1% reported at least mild functional impact with over half (58.2%) reporting moderate to severe impact. Head pain/headaches (66.7%) represented the largest area of pain in the sample followed by lower back pain (53.1%) and leg pain (49.3%).

Conclusions: Almost 9 out of 10 Veterans included in this sample reported experiencing pain and within that subset of Veterans, the majority reported functional impact and pain related to the head, legs, and lower back. The results of this study suggest the importance of incorporating pain-related services and recommendations as a regular component of TBI evaluations with Veterans.

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F.S. AHMED, J. MYLER, T. MCMILLAN & C. REALE. The Role of Negative Affect in Reporting Persistent Post-Concussive Symptoms.

Objective: Post-Concussive Symptoms are typically short-lived. Persistent Post-Concussive Symptoms (PPCS; experienced beyond 3 months after concussion) are less common. Data on PPCS is conflicting, and the proposed mechanisms range from biological to psychosocial. In this study, we examined the impact of general negative affect on the reporting of PPCS in individuals who experienced a concussion at least 1 year ago.

Participants and Methods: 110 undergraduate students participated in this online-administered study. 38 reported having a past concussion. Participants completed self-report measures of post-concussive symptoms (Rivermead Post-Concussion Symptoms Questionnaire) and negative affect (Patient Health Questionnaire, Anxiety Disorder Diagnostic Questionnaire, Positive and Negative Affect Scale).

Results: Because the RPQ scores were not normally distributed, we conducted a Mann Whitney U test to examine whether endorsement of PCS was different between groups. As expected, there was a statistically significant difference between groups, with those who had concussions reporting more PCS symptoms.

Data were submitted to hierarchical multiple regressions, adjusting for the impact of demographics. The combined effect of negative affect responses accounted for an additional 12% (RPQ-3) and 23% (RPQ-13) of variance in RPQ scores. Though the model was statistically significant for RPQ-3 scores, the individual negative affect measures did not reach significance. For the RPQ-13, however, PANAS and PHQ scores, but not ADDQ, were significant predictors of RPQ scores.

Conclusions: These results suggest an influence of negative affect on reporting PCS over 1-year post concussion. Further, our findings highlight the importance of assessing general negative affect when evaluating presence of post-concussive symptoms. These results highlight the need for further research on the relationship between affect and PPCS.

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C.E. MEINHAUSEN, N.S. DAILEY & W.D. KILLGORE. Identifying Memory Retrieval Strategies Following a Mild Traumatic Brain Injury Using the CVLT-II.

Objective: Mounting evidence suggests learning, memory and attentional deficits occur in the acute stage of mild traumatic brain injury (mTBI). However, the extent to which these deficits remain longer than 12 weeks is unclear. This study aimed to identify memory retrieval strategies used in the acute and chronic stages post-mTBI. It was predicted that the use of serial and semantic clustering would differ in the acute stage (2-12 weeks) compared to adults the chronic stage (6-12 months) and healthy controls.

Participants and Methods: A total of 69 adults participated in the study and included 20 HCs, 26 adults in the acute phase, and 23 adults in the chronic phase. The California Verbal Learning Test, 2ndEdition (CVLT-II) was administered to identify the use of memory retrieval strategies including serial and semantic clustering. Serial clustering involves recalling words in the order in which they were heard and semantic clustering is a secondary memory strategy in which words are grouped by meaning.

Results: Raw semantic and serial clustering scores were compared between the acute, chronic and HC groups using one-way ANOVAs. There was a main effect of group on serial clustering ($F(2,66)=3.142$, $p=0.05$, partial eta-squared=0.87). Post-hoc comparisons showed the acute group had significantly fewer serial clusters than HCs ($p=0.03$) and the chronic group ($p=0.04$). There was also an observed tendency in the acute group to perform semantic clustering over the HCs and the chronic group.

Conclusions: Our findings show that serial recall was reduced in the acute group relative to the chronic and HC groups, suggesting the use of different memory retrieval strategies. These findings, in addition to an increased tendency to use semantic clustering may indicate a

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compensatory effect during early mTBI recovery in response to deficits in the memory process.

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J. MEYER & P. ARNETT. Effects of Head Trauma on Planning and Problem Solving in a Sample of Victims of Intimate Partner Violence.

Objective: Victims of Intimate Partner Violence (IPV) are at high risk for subconcussive impacts and traumatic brain injury (TBI) due to direct hits to the head and face and are additionally at risk for hypoxic brain injuries (HBI) due to strangulation. Cognitive sequelae of these injuries may negatively affect victims' ability to engage in the cognitively taxing process of safety planning and extricating themselves from abusive relationships. The present study aimed to evaluate the effects of these injuries on IPV victims' performance on an ecologically valid test of problem solving and planning.

Participants and Methods: A sample of 44 female IPV victims recruited from the community completed a clinical interview assessing for subconcussive impacts, TBI and HBI and a battery of neuropsychological tests including the Behavioral Assessment of Dysexecutive Syndrome (BADS) Zoo Maps Planning Test, an ecologically valid measure of problem solving and planning. Multiple regression was used to evaluate the effects of head trauma on performance on the BADS Zoo Maps test.

Results: Multiple regression results indicated that participants who experienced higher numbers of subconcussive impacts performed *better* on the Zoo Maps test (β=0.32, p<.05); however, sustaining one or more TBI *negatively impacted* performance (β=-0.40; p<.05), as did sustaining one or more HBI (β=-0.27, p<.10).

Conclusions: Results of this study indicate that sustaining a TBI or HBI negatively impacts performance on a test of problem solving and planning. These observed deficits may limit a victim's ability to leave a relationship, thereby putting the victim at continued risk for subsequent head trauma. The finding of improved performance with increased subconcussive impacts was unexpected. Victims of IPV who are experiencing frequent violence are likely engaging in continuous problem solving and planning in their efforts to stay safe, and this finding may therefore reflect cognitive resilience developed in efforts to stay safe.

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M.M. MILES & B. MARCOPULOS. Metacognitive Moderators of Cogniphobia in a TBI Sample.

Objective: This study examined the effects of a self-reported history of traumatic brain injuries (TBIs) on cogniphobia and metacognitive factors. Cogniphobia, an unreasonable fear of head pain upon cognitive exertion, cognitive self-consciousness (CSC), being aware of ones' thinking, and positive beliefs about worry (PBW), believing worrying is helpful, were used to examine differences in metacognitive beliefs influencing cogniphobia. We hypothesized that 1. self-reported TBI history would positively correlate with cogniphobia; 2. stronger CSC and PBW would predict higher cogniphobia scores; and 3. the association between self-reported TBI history and cogniphobia would be stronger for those with greater CSC and PBW.

Participants and Methods: Survey responses from 620 Amazon Mechanical Turk workers were analyzed using the Texas Evaluation of Concussion History (Cullum, 2018), a modified version of the Cogniphobia Scale (Suhr, 2018; Martelli, MacMillan, Zasler, & Grayson, 1999), and the Metacognitions Questionnaire-30 (Wells and Cartwright-Hatton, 2004).

Results: Cogniphobia scores did not differ between those with a self-reported TBI history and those without (t=1.216, *p*=.487). Self-reported TBI history did not predict presence of cogniphobia, but two separate regression analyses showed that higher scores of CSC (F=27.022, R^2=.042, *p*<.001) and PBW (F=101.893, R^2=.142, *p*<.001) significantly predicted higher cogniphobia scores.

Conclusions: These results suggest that if someone has a tendency to ruminate on their own thoughts or cognitive beliefs, they will likely be more cogniphobic. Fear-related thinking patterns or psychological conditions may encourage the development of cogniphobia more so than injury history (Boone, 2009). These findings are similar to those in pain literature in that pain beliefs and self-reported cognitive symptoms are very important when considering treatments (Stulemeijer, Vos, Bleijenberg, & Van der Werf, 2007).

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A. PALUMBO, M. LAZAR, S. WU, G. MERCURI, H. AZMI, C. OGEDEGBE, G. WYLIE, J. FELDMAN & G.T. VOELBEL. Integrity of White Matter Tracts Post mTBI is Associated with PTSD and Neurobehavioral Symptoms.

Objective: This study identified white matter tracts that are associated with PTSD symptoms and neurobehavioral symptoms post mTBI, both immediately post injury and at 4 month follow up.

Participants and Methods: Sixteen adults seeking treatment for mTBI and a control group of 18 healthy adults participated in the study and met criteria for inclusion in the study. Post-concussive symptoms were assessed with the Neurobehavioral Symptom Inventory (NSI), and level of post-traumatic stress was assessed with the Posttraumatic Stress Disorder Checklist – Civilian Version (PCLC). White matter integrity was evaluated with Diffusion Tensor Imaging (DTI), including measures of mean diffusivity (MD), fractional anisotropy (FA), radial diffusivity (RD) and axial diffusivity (AD).

Results: The mTBI group had a higher mean PCLC and NSI than the control group at baseline and 4 month follow up. The mediation analyses demonstrated the FA values in the left cingulate gyrus approached significance in mediating the group difference in PCLC scores at baseline. The moderation analyses demonstrated the AD values in the left superior longitudinal fasciculus significantly moderated the group difference in PCLC at baseline and 4 month follow up, as well as the group difference in NSI at baseline and 4 month follow up. The AD values in the right corticospinal tract approached significance in moderating the group difference in PCLC at 4 months, and significantly moderated the group difference in NSI at 4 months. The AD values of the right anterior thalamic radiation approached significance in moderating the group difference in NSI at baseline and PCLC at 4 months.

Conclusions: The integrity of the left cingulate gyrus, left superior longitudinal fasciculus, right corticospinal tract and right anterior thalamic radiation after mTBI may affect the recovery of PTSD symptoms and neurobehavioral symptoms up to 4 months post mTBI.

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H.A. PARKER, J. RANSON, M. MCCREA, J. HOELZLE, T. DEROON CASSINI & L.D. NELSON. Personality Characteristics Predict Chronic Symptoms and Recovery Course after Mild Traumatic Brain Injury.

Objective: Despite general consensus that personality factors are critical in mTBI recovery, they often are underexamined. This study evaluated to what extent diverse measures of personality and psychiatric symptoms prospectively predict mTBI recovery.

Participants and Methods: We completed comprehensive psychological assessments of hospital patients with mTBI (*N* = 75; 55% with abnormal head CTs; M = 2 days post-injury). mTBI symptoms were evaluated at 3 months using the Sport Concussion Assessment Tool – 3rd Edition (SCAT3). Modern mediation analyses were used to test the hypothesis that personality traits predict chronic symptoms through

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effects on acute psychological response to injury. Logistic regression was used to establish predictors of distinct symptom trajectories.
Results: Maladaptive Personality (i.e., a common factor of seven personality scales) exerted an indirect effect on 3-month SCAT3 symptom severity through the mediator of acute somatic complaints (MMPI-2-RF RC1 score); adaptive personality (positive emotionality, PEM) moderated this relationship, such that the deleterious effect of Maladaptive Personality on 3-month SCAT3 through enhancement of acute somatic complaints occurred only for individuals with low to moderate PEM ($p < .001$, $R^2 = .19$). Using a reliable change index cutoff, 28.0% reported worsening mTBI symptoms from the acute to 3-month assessment. Acute anhedonia (MMPI-2-RF RC2 score) was the only predictor of worsening mTBI symptoms ($p = .015$, OR = 2.3).
Conclusions: This study identified interactive roles of adaptive and maladaptive personality characteristics in predicting acute somatic and chronic mTBI symptoms. That different factors predicted symptom severity and symptom trajectory highlights the importance of considering what outcome is most valued when selecting predictors. The findings indicate that interventions that bolster resilience and reduce post-traumatic depression may be important for patients with personality traits that confer risk for chronic mTBI symptoms.
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H.A. PARKER, E.J. HARFMANN, B. REMLER & T.A. HAMMEKE. The Visual Pattern Sensitivity Test (VPST): A Novel Approach for the Assessment of Light Sensitivity Associated with Mild TBI and Post-Traumatic Migraine.
Objective: To develop a measure of pattern-induced visual distress to guide management of visual complaints common in mTBI and post-traumatic migraine.
Participants and Methods: 98 veterans and VA staff. Age $M = 33.2$, SD = 9.4. The VPST includes 20 high-contrast striped patterns designed to elicit pattern-induced visual distress and 10 items designed to detect response bias. Items are classified into 10-item subscales: Benign, Moderate Distress, High Distress. Participants rate their visual distress per item ("0" (no distress) to "10" (makes me feel ill)). The examiner rates behavioral signs of overall distress ("0" (no distress) to "10" (high distress)); ratings above 3 indicate clinically significant distress. Subjective complaints were assessed with the Neurobehavioral Symptom Inventory (NSI) and a headache questionnaire.
Results: 66.3% had a history of mTBI. Time since last mTBI ranged from 0 to 33 years ($M = 8.4$, SD = 7.0). 61.2% reported a significant problem with headaches. Light sensitivity was reported with headaches by 60.2% and without headaches by 53.1%. The VPST showed excellent reliability ($\alpha = .98$) and all items added to the scale reliability. Subscales showed similar properties. Participant ratings were greater for Moderate ($M = 56.2$, SD = 25.4) and High Distress ($M = 59.0$, SD = 25.2) than Benign ($M = 14.8$, SD = 14.9). An embedded measure of symptom validity (NSI total > 66) correlated with the Benign subscale, $r = .29$, $p = .012$. A Benign mean correction was computed to adjust for response bias, resulting in tempered ratings on corrected Moderate ($M = 41.3$, SD = 18.8) and High Distress ($M = 44.2$, SD = 19.4). Examiner ratings ranged from 0 – 9 ($M = 3.1$, SD= 2.5); 39.8% were rated as having clinically significant visual distress.
Conclusions: The VPST is a novel measure of pattern-induced visual distress that demonstrates strong psychometric properties and has promise for advancing research and clinical care in the evaluation and management of light sensitivity associated with post-traumatic migraine.
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E. POLEJAEVA, W. CARR, K. DELL & E. WASSERMANN. How Do You Characterize "Breachers' Brain"?
Objective: "Breachers" are military and law enforcement personnel exposed to repeated low-level blast as part of their occupational duties during training and operations. Repeated low-level blast exposure has been associated with symptoms similar to concussion but a cognitive profile on neuropsychological testing has not been established. This study investigated effects of exposure to low-level blast on several cognitive domains: processing speed, executive function, and attention.
Participants and Methods: Military and law enforcement personnel (n=20) completed a history of blast exposure (interview), Beck Depression Inventory-Second Edition, and several neuropsychological tests: Trails A, Trails B, Paced Auditory Serial Addition Test (PASAT) 3′, PASAT 2′, Delis-Kaplan Executive Function System (D-KEFS) Letter Fluency, D-KEFS Category Fluency, D-KEFS Verbal Category Switching, Wechsler Test of Adult Reading, and Wechsler Abbreviated Scale of Intelligence-Second Edition.
Results: There was an association between length of breaching career and ability to set-shift on D-KEFS Verbal Category Switching, $F(4,15)=3.595$, $p=.030$. A Tukey post hoc test revealed that ability to set-shift was lower in individuals breaching for 10-15 years (9.75 ± 1.7, $p=.05$) compared to breaching for 5-9.9 years (16 ± 3.7). These findings were statistically significant when controlling for age, education, and race. No differences were found on the other cognitive tasks or on symptoms of depression.
Conclusions: These results suggest that changes in set-shifting abilities are present following longitudinal low-level blast exposure, specifically: exposure greater than 10 years results in decline compared to lower duration of exposure. Differences in set-shifting measures of executive functioning are consistent with prior meta-analysis of cognitive impairment in mTBI from blast. Our results are limited by a small sample and further investigation is needed to examine the impact of this decline on daily function.
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A. RAIKES & W. KILLGORE. Anterior Cingulate Gyrus Volume Predicts Changes in Post-mTBI Daytime Sleepiness Following Blue Wavelength Light Therapy.
Objective: Mild traumatic brain injuries (mTBIs) are often associated with increased daytime sleepiness and the onset of depressive symptoms. Prior work suggests that morning blue wavelength light (BLT) exposure may have positive effects on both sleepiness and depression via changes in circadian rhythms of hormone release. However, the neural underpinnings of post-injury changes and treatment-related improvements are unclear. We hypothesized that BLT treatment would improve daytime sleepiness and depressive symptoms and that gray matter volume (GMV) in regions important for focused attention, sleep disruption, and mood would predict these improvements.
Participants and Methods: Twenty-three adults with a recent mTBI (age: 25.39±7.28y; months post-injury: 9.17±5.42) participated in a 6-week light-therapy intervention. Individuals were randomized to receive either blue wavelength or placebo amber wavelength light (30 min/day in the morning). Participants self-reported daytime sleepiness (Epworth Sleepiness Scale, ESS) and depression (Beck Depression Inventory, BDI) at pre- and post-treatment. Voxel-based morphometry was used to identify pre-treatment correlates of treatment-related daytime sleepiness improvements.
Results: Individuals receiving blue light, but not amber light, had significantly lower ESS ($p=0.03$) and BDI ($p=0.007$) post-treatment scores. Improved daytime sleepiness was associated with less Anterior Cingulate Gyrus (ACG) GMV at pre-treatment. Additionally, lower ACG GMV was associated with greater improvement in BDI scores following blue but not amber light therapy ($\eta^2 = 0.292$) in a linear regression.

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Conclusions: BLT is effective for improving daytime sleepiness and depression in some people following mTBI. We observed improvement in these following blue light therapy for those with smaller ACG volumes. The ACG plays critical roles in both sleep and depression and these findings suggest that smaller ACG volumes may play a role in responsiveness to BLT.

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H. RAU, E. PESKIND & K. PAGULAYAN. Self-Reported Prospective and Retrospective Memory in OEF/OIF/OND Veterans with a History of mTBI: Relationships with Neuropsychological Functioning and Quality of Life.

Objective: Many OEF/OIF/OND Veterans with a history of mTBI report persistent memory difficulties, though empirical evidence of cognitive changes remains equivocal. This study examined whether self-reported difficulties in retrospective and prospective memory (RM and PM) were associated with neuropsychological functioning and quality of life.

Participants and Methods: Participants were 43 OEF/OIF/OND Veterans with a history of mTBI. All completed the Prospective-Retrospective Memory Questionnaire (PRMQ), Quality of Life after Brain Injury scale (QOLIBRI), and neuropsychological measures of PM (Memory for Intentions Test, MIST), RM (California Verbal Learning Test-Second Edition, CVLT-II), and executive functioning (Wisconsin Card Sort Test, WCST). Participants were grouped into high/low self-reported difficulties with PM and RM using the corresponding subscales from PRMQ, with a T-score of 40 used as the cut-point.

Results: 27% of the sample had high self-reported difficulties with PM, and those participants had more failures to maintain set on the WCST (p=.009) compared to those reporting fewer PM difficulties. 38% of the sample had high self-reported RM difficulties, and those participants had lower CVLT-II immediate (p=.026) and delayed recall (p=.009) compared to those reporting low RM difficulties. Further, individuals with high self-reported difficulties in both RM and PM had significantly lower cognitive (p=.036) and daily (p=.012) quality of life on the QOLIBRI.

Conclusions: Results indicate that self-reported retrospective and prospective memory difficulties are associated with different patterns of neuropsychological test performance, consistent with each of these constructs. However, subjective PM and RM difficulties were both associated with lower reported quality of life, suggesting that although certain aspects of memory may be differentially affected in this population, they appear to have similar impacts on perceived quality of life.

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J. REYES, J. NGUYEN, T. HOWARD, P. CLIFTON, A.S. MCINTOSH, M. MAKDISSI, P. CAMERON, J.V. ROSENFELD, C.J. WILLMOTT & B. MITRA. The Potential of Head Acceleration Events in Australian Football League (AFL) and Australian Football League Women's (AFLW) to Augment Current Best Practice in Concussion Screening.

Objective: To explore the feasibility and potential utility of a non-helmeted accelerometer for detecting high head acceleration events (HAEs) to augment identification of elite Australian Football League (AFL) & Womens' (AFLW) players for concussion screening.

Participants and Methods: Design & Setting: A prospective observational study with AFL (Jardine Lloyd Thompson) and AFLW (National Australia Bank) clubs during the 2017 season. **Participants:** 92 AFL and 118 AFLW players. **Main Outcomes:** The X-Patch® wearable accelerometer identified players with high HAEs defined as >95g (males) and >85.5g (females) which were compared to players identified for sideline assessment. High HAEs were assessed using video footage and a video footage sub-group of players were reviewed for concussive signs by a trained medical reviewer blinded to accelerometer outputs.

Results: High HAEs were recorded for 26 players (50% male). Ten of these players were not visible in video footage at the time of the HAE, so head impacts could not be confirmed. Of the remaining 16 players, two were identified by club personnel on match-day and had signs of concussion on video. Among the 14 players not identified, seven had head impacts that could be confirmed with video review, and seven were visible in the footage but a head impact could not be identified. Among 184 players who did not record high HAEs, five players were identified to have potential concussion.

Conclusions: Substantial improvement in accuracy and reliability of accelerometers is indicated before consideration to use as an adjunct to direct observation and video reviews for concussion screening.

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M.K. REYNOLDS, P.S. BEAN & S. HALL. Examining the Effect of Terminology & Emotional Difficulties on Perceptions of Mild Traumatic Brain Injury.

Objective: The terms "mild traumatic brain injury" (mTBI) or "concussion" may evoke different expectations. These expectations are important because previous researchers have shown that expected symptoms at the time of injury were one of the best predictors of actual symptoms post-injury. The current study investigated whether terminology, as well as participants' emotional difficulties (e.g., anxiety, depression) have an effect on expected brain injury symptoms.

Participants and Methods: Participants (n = 224) read a vignette depicting a person sustaining an mTBI in a motor vehicle accident. Groups were told that they had sustained a "concussion," "mTBI," or "no diagnosis because their concussion symptoms had resolved." Participants reported expectations regarding symptoms, consequences, self-efficacy, recovery length, changes in life perspective, and undesirability of the injury. Participants also reported their current mental health symptoms.

Results: Worse changes in life perspective (e.g., no longer looking forward to the future) were expected for "mTBI" compared to "concussion," $F(3, 216) = 3.23$, $p = .023$, regardless of participants' mental health. Participants with emotional difficulties viewed all head injuries as more undesirable, $F(3, 216) = 4.643$, $p = .032$, and expected worse changes in life perspective, $F(3, 216) = 13.467$, $p < .01$, compared to those with no emotional difficulties.

Conclusions: Participants with emotional difficulties viewed head injuries as more serious conditions compared to those with no mental health difficulties. Thus, those with emotional difficulties may have a more severe experience if they were to sustain an actual head injury, as they have more negative injury expectations compared to those with no emotional difficulties.

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R.S. SCHEIBEL, M. TROYANSKAYA, N.J. PASTOREK, E.A. WILDE & H.S. LEVIN. Verbal Memory Dysfunction Following Deployment-Related Traumatic Brain Injury.

Objective: Traumatic brain injury (TBI) is a leading cause of morbidity and disability in veterans and active duty service members following combat deployment to Iraq and Afghanistan. Mild TBI (mTBI) accounts for about 82% of all TBIs in this military population and sustaining repetitive mTBI is common. Preclinical research has demonstrated the deleterious effects of repetitive TBI, even when it is mild, and clinical studies conducted with post-deployment mTBI samples provide some

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initial evidence for changes on neuroimaging and the potential for late development of chronic traumatic encephalopathy (CTE).
Participants and Methods: Since 2009, a longitudinal study of deployment-related TBI has enrolled a total of 177 Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn combat veterans, including 137 who reported a history of at least one deployment- related TBI (TBI Group) and another 40 with no history of TBI (Comparison Group).
Results: Twelve out of the 137 TBI Group participants (approximately 9%) were found to have exhibited a decrease of one standard deviation or more on Consistent Long-Term Retrieval (CLTR) from the Verbal Selective Reminding Test between study assessments that were at least 18 months apart. Over this same time frame, these twelve participants were stable or exhibited improvement on measures of symptoms associated with common psychiatric conditions, including depression and posttraumatic stress disorder. In addition, a review of their medical records revealed no other psychiatric or medical conditions that could explain the decline on cognitive testing. None of the Comparison Group participants had decreased performance and about 12% exhibited improvement.
Conclusions: Cognitive decline within this subset of TBI participants and the absence of other conditions that might explain the change is most consistent with the diagnosis of Mild Neurocognitive Disorder due to TBI. This progression may reflect the late development of TBI-related neuropathology, such as CTE.
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A. SEKELY, S. DHILLON & K.K. ZAKZANIS. Comparison of Cognitive and Occupational Functioning in Patients who have Sustained an Uncomplicated Versus Complicated Mild Traumatic Brain Injury in the Post-Acute Recovery Period.
Objective: The goal of the current study is to articulate differences in cognitive and occupational functioning in patients who sustained a mild traumatic brain injury (mTBI) with (i.e., complicated mTBI) and without (i.e., uncomplicated mTBI) positive neuroimaging findings in the post-acute stage of recovery. It was hypothesized that intracranial injury as evinced on neuroimaging (i.e., complicated mTBI group), would perform more poorly than the uncomplicated mTBI group, across select cognitive domains and in terms of occupational functioning.
Participants and Methods: Archival data from a random sample of individuals were obtained from a larger sample of litigating patients who were referred for neuropsychological examination secondary to mTBI. Participants were included if they had completed the Neuropsychological Assessment Battery Screening Module, and if their neuropsychological test performance was deemed to be credible as evidenced by validity measures. All participants met criteria for mTBI according to the World Health Organization standards (i.e., shared the same acute injury characteristics except for the presence or absence of intracranial injury.) The final sample consisted of 99 individuals (39 complicated and 60 uncomplicated mTBI). Participants were assessed approximately 32 months' (SD=14) post-injury.
Results: No significant differences were found between groups on attention (U=1033, p=.326, d=.34), executive function (U=810.5, p=.077, d=.46), language (U=1143, p=.846, d=.17), memory (U=1027, p=.831, d=.03), or visuospatial (U=902, p=.055, d=.22) domains. No significant differences were found between groups in terms of return to work status ($c^2(2)$=1.023, p=.600).
Conclusions: Our findings indicate no differences in cognitive or occupational functioning between those who have sustained an uncomplicated and complicated mTBI in the post-acute period.
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S.F. SORG, A. CLARK, M. WERHANE, K.A. HOLIDAY, V. MERRITT, M. WALSH, A. JAK, K. HANSEN, D. SCHIEHSER & L. DELANO-WOOD. Reduced Time-Based Prospective Memory Performance in Veterans with Histories of Mild Traumatic Brain Injury and Associations with White Matter Microstructure.
Objective: Prospective memory (PM) remains understudied in the context of mild traumatic brain injury (mTBI) recovery. Some studies suggest PM with time-based cues, which are dependent on self-initiated retrieval, may be more vulnerable to mTBI than PM with more overt event-based cues. Given that few studies have investigated the neurobiological underpinnings of PM subtypes, we assessed PM performance and associations with cerebral white matter microstructure via connectometry analysis in Veterans with and without reported mTBI histories.
Participants and Methods: 31 Veterans (mTBI=19, Military Controls [MCs]=12) with sufficient effort testing completed a structured TBI history interview, the PTSD Checklist (PCL), the Memory for Intentions Test (MIST) as a test of PM including Time Cue and Event Cue subscales, and a diffusion-weighted neuroimaging scan. Connectometry analysis was conducted via DSI Studio with white matter microstructure measured using quantitative anisotropy (QA).
Results: Compared to MCs, the mTBI group performed worse on the MIST Time Cue subscale ($p<.05$), but not on the Event Cue subscale ($p=.58$). PTSD symptom severity was not associated with MIST Time Cue scores in the mTBI group ($p=.18$). Connectometry analysis, controlling for age and PTSD severity, revealed MIST Time Cue score was positively associated with QA of the corpus callosum, external capsule, corticospinal tract and superior longitudinal fasciculus ($p<.05$). No significant associations between tracts and Event Cue scores were observed ($p>.20$).
Conclusions: Results showed that mTBI is associated with poorer time-based PM performance, which was not associated with PTSD symptom severity. Results suggest that, in the context of mTBI, cognitive systems underlying self-initiated, time-based but not event-based PM may be compromised. Greater reliance of time-based PM on efficient integration of cortical regions via multiple white matter pathways (as compared to event-based PM) may contribute to this differential sensitivity.
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S. STEPHEN, G. SHAN, S.J. BANKS, C. BERNICK & L. BENNETT. Professional Fighting Style as a Moderator between Fight Exposure and Cognition.
Objective: Repetitive head impacts in combat sports have been associated with cognitive decline over time. However, differences in fighting styles and rules have resulted in a diverse spectrum of injury. Martial artist populations have demonstrated lower injury rates and higher overall concussion safety than those of other combat sports. Little is known about the effects of repetitive head impacts on cognitive performance of martial artists relative to other fighters, such as boxers. This study aimed to determine if there is a differential effect of fighting style on cognitive functioning in two independent samples of professional martial artists and boxers.
Participants and Methods: 40 active professional martial artists and 194 active professional boxers from the Professional Fighters Brain Health Study (PFBHS) were compared using a moderation analysis of independent samples to determine the relationship between fighting style, number of professional fights, and cognitive ability. The martial arts cohort consisted of fighters who had competed professionally prior to baseline in Muay Thai, Kickboxing, or Judo. The two samples were controlled for ethnicity, age, and years of education. Cognitive performance was assessed utilizing the CNS Vital Signs computerized battery of cognitive and motor tests in addition to a series of Verbal Fluency tests.
Results: Fighting style significantly moderated the relationship between number of professional fights and Verbal Fluency performance at baseline, such that a boxer had lower Phonetics ($p<0.0001$) and Semantics

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(p=0.0330) scores than a martial artist of the same age, education, and ethnicity. No moderation relationship between fighting style and CNS Vital Sign scores was observed.
Conclusions: Fighting style was associated with baseline Verbal Fluency differences among martial artists and boxers.
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J. STOCKS, V.T. GALLAGHER, D. COLEGROVE, B. VESCI, J. MJAANES, A. HERROLD & J. REILLY. Remote History of Concussion Associated With Deficits in Eye Movement Measures of Executive Functioning Among Asymptomatic Female Athletes.
Objective: Prior reports indicate history of concussion is associated with impaired oculomotor functioning, implicating a modulating influence of neurotrauma on sensorimotor and cognitive control functions as assessed by eye movement paradigms. This study aimed to evaluate whether eye movement measures assessing reflexive and voluntary (i.e., executive) control of eye movements can differentiate female athletes with and without history of mild traumatic brain injury (hxmTBI).
Participants and Methods: Twenty-six female collegiate contact sport athletes with (n=13) or without (n=13) history of concussion (hxMTBI and CON, respectively) completed eye movement testing, including: 1) a prosaccade task requiring an eye movement to a visual target, 2) an antisaccade task requiring inhibition of an eye movement to a visual target and instead execution of a saccade in the opposite direction, and 3) a memory-guided saccade task requiring an eye movement to a remembered target location after a variable delay interval. Testing was performed prior to pre-season training to avoid potential confounding effects of recent exposure to subconcussive head impacts.
Results: Linear mixed-effects models revealed hxMTBI participants had increased latency on the antisaccade ($p<.001$) task and decreased latency on the prosaccade task ($p<.05$), indicating decreased speed of volitional, but not reflexive, shift of visual attention. hxMTBI individuals had reduced accuracy on the memory-guided saccade task ($p<.001$), with a trend towards increased error at longer delay periods, reflecting reduced spatial working memory accuracy under conditions of increased maintenance demands. Antisaccade error rate did not differ between groups.
Conclusions: Among asymptomatic female collegiate athletes, history of concussion was associated with deficits in executive control of attentional shift and working memory. This study provides support for the use of eye movement measures to detect subtle neurocognitive changes associated with remote exposure to head trauma.
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A.M. SVINGOS, S. GREIF, G. HROMAS, Z. HOUCK, S.C. HEATON, M.S. JAFFEE & R. BAUER. The Relationship Between Concussion Symptoms and Recovery Expectations Among Patients Presenting to an Interdisciplinary Concussion Clinic.
Objective: Little is known about patients' recovery expectations following concussion and the factors influencing these expectations. Here, we characterize the range of recovery expectations held by patients with concussion and examine the role of concussion symptoms.
Participants and Methods: Data was obtained from 53 patients (median age=25.7; 54.7% female) seen in an interdisciplinary concussion clinic (median days since injury=75). Self-reported concussion symptoms (number and severity) were measured using the Sport Concussion Assessment Tool. Recovery expectations were measured by asking participants "how soon do you expect to fully recover?" Responses were coded into short versus long expected recovery groups using the median cut-point (2 weeks). T-tests and chi-square tests were used to examine group differences in demographic and injury-related factors.
Results: Nearly half of the sample (47.2%) indicated that they expected a full recovery in two weeks or less, with the remainder of patients expecting a full recovery in 15-30 days (15.1%), 31-90 days (18.9%), 91-365 days (9.4%), or over a year (9.4%). Individuals with positive recovery expectations presented closer to the time of their injuries (p=.049). Those expecting longer recoveries reported a greater number of concussion symptoms (p=.009). Participants expecting longer time to full recovery were more likely to endorse "difficulty remembering things" than individuals expecting shorter recovery periods (p=.029).
Conclusions: Recovery expectations may be influenced by time since injury and number of current concussion symptoms. Patients with subjective memory complaints may be particularly at risk of having negative recovery expectations. Future studies should explore the extent to which psychoeducation can influence recovery expectations in this population, and the bearing of recovery expectations on recovery outcomes.
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S. THRASHER & K. GORMAN. Accuracy of Knowledge About Traumatic Brain Injury Among VA Healthcare Providers.
Objective: This project explored VA providers' perceived knowledge of traumatic brain injury (TBI) and identification for ongoing education needs.
Participants and Methods: Fifty-six health care professionals at a VA Medical Center completed a demographic and TBI needs assessment sruvey using the Goveier et al. (1988) and Bradford (2015) 27-item questionnaire. Kruskal-Wallis one-way analysis of variance by ranks was used to compare the median number of correct questionnaire responses across participant groups based on self-reported TBI experience, educational background, departments, profession, and years of professional practice.
Results: Respondents (n= 56) were predominantly female (79%) and included: nurses; occupational, physical, & speech therapists; social workers; psychologists; physicians; & pharmacists, physician assistants, or nurse practitioners. Respondents' educational levels varied from Associate's degrees to professional degrees (MD/DO, Ph.D./Psy.D., M.S., R.N.). The majority reported more than 10 years of professional practice (71%). Minimal TBI training was reported by 19% of respondents, 45% reported entry-level skill, 19% reported significant training, and <1% reported extensive training. Total accuracy scores ranged from 13 to 22 correct answers out of a possible 26 (M = 16.12, SD = 1.69). On average, the respondents correctly endorsed 62% of items. Respondents most accurately answered items about brain damage (M = 97%), followed by recovery (M = 83%), unconsciousness (M = 56%), and amnesia (M = 18%). There were no significant between-group differences based on TBI knowledge, educational level, department, profession, or years of professional practice.
Conclusions: The majority of VA providers showed inaccuracies in their knowledge of TBI, particularly with regard to amnesia, unconsciousness, and recovery time. Inaccuracies were noted across departments and professions.
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M. TROYANSKAYA, N.J. PASTOREK, N.J. PETERSEN, A. WALDER & R.S. SCHEIBEL. Resiliency and Deployment-Related Characteristics as Predictors of Societal Participation Following Combat Deployment.
Objective: Problems with social functioning, family relationships, and initiation are highly prevalent among individuals deployed to Iraq and Afghanistan. This study investigates the influence of resiliency and deployment-related characteristics on societal participation in recently deployed veterans.

Participants and Methods: Participants were 223 recently deployed veterans of whom 143 reported history of at least one mild traumatic brain injury (mTBI) during deployment (TBI group) and 80 had no history of mTBI or concussion (Comparison group). All participants completed self-report measures of societal participation, resiliency, and severity of the posttraumatic stress disorder symptoms. Basic demographics, deployment characteristics, and injury-related information were also collected.
Results: Participants in the TBI and Comparison groups did not differ significantly in basic demographics and deployment characteristic (all p-values >0.5). A multivariable regression model showed a relation between resiliency and participation, with the strongest relation in individuals with history of mTBI vs those without (p-value=0.0061). In addition, in the mTBI group there was a significant interaction (p-value = 0.003) between everyday participation and coping abilities in individuals with history of mTBI, while there was no significant interaction (p-value>0.5) between participation and deployment-related characteristics.
Conclusions: Resiliency is an important predictor of societal participation, initiation, and other aspects of community integration following combat deployment.
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P.J. UY, Y. MATSUZAWA, A. CHILDS, W. LU, C. BOUJAOUDE, W. BARR & J. RICKER. Sports Concussion Assessment Tool-3 (SCAT3) and Objective Impairments on Neuropsychological Tests.
Objective: The Sports Concussion Assessment Tool-3 (SCAT3) Symptom Evaluation (S3SE) has been used in a variety of settings to gather information on concussion symptoms (Harrold et al., 2017; Bin Zahid et al., 2016). There is limited research on the association between S3SE and objective test performance (Uy, et al., 2017). Moreover, no study to this point has investigated if S3SE scores predict low performance on neuropsychological tests. This study investigated if scores on cognitive-related items on the S3SE (Asken et al., 2017) predicted -1.5*SD* and -2*SD* on test scores.
Participants and Methods: This retrospective study included 119 adult participants who received a brief neuropsychological evaluation at an outpatient concussion program in a large urban medical center. The study used the following tests for objective scores: Wechsler Adult Intelligence Scale-Fourth Edition (WAIS IV) Digit Span and Coding subtest, Delis-Kaplan Executive Function System (D-KEFS) Verbal Fluency (VF), California Verbal Learning Test-II (CVLT-II) Long Delay Free Recall (LDFR), Stroop Color-Word (CW), and Trail Making Test Trail B (TMTB). All cases passed performance validity tests.
Results: Multiple linear regression analyses were used to determine if S3SE scores predicted low scores on cognitive tests at the -1.5*SD* and -2*SD* levels. To account for Type I error, Bonferroni Correction (p =0.004) was used. At the -1.5*SD* level, memory (LDFR) was found to be associated with S3SE cognitive items, p = 0.001. At the -2*SD* level, LDFR did not meet the Bonferroni Correction value (p = 0.006). All other domains were not significant at the corrected p-value.
Conclusions: Results of the study show that the S3SE Cognitive-related items predicted low scores in objective scores (LDFR). This result is surprising as cognitive impairments are expected to return to baseline. Additional analysis of these individuals is important to better understand the patient profile of those that present to community outpatient settings and show low cognitive performance.
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U.M. VENKATESAN, C.B. FORTIER, D. SALAT, W. MILBERG & R. MCGLINCHEY. Deployment Trauma Moderates Age-Related Decline in Cortical Thickness.
Objective: Recent evidence suggests that a constellation of clinical conditions contribute to negative outcome in post-9/11 veterans, potentially resulting in long-term neurobiologic consequences. We examined interactional effects of age and the deployment trauma phenotype (DTP; Lippa et al., 2015), comprising military-related mild TBI (mTBI) posttraumatic stress disorder (PTSD), and depression— relative to individuals with partial phenotypes and controls— on global and regional cortical thickness (gCT, rgCT).
Participants and Methods: Participants were organized into mutually exclusive cross-sectional groups, with N=352 (DTP n=52; PTSD+mTBI n=70; PTSD+depression n=33; PTSD n=64; mTBI n=34; no diagnosis/controls n=99). Groups did not differ in mean age (32±8, sample-wide) or education. Moderation analyses were used to probe interactions between diagnostic group and age in predicting mean gCT and factor-analyzed rgCT scores. Within-group analyses were undertaken to explore interactions between age and psychological and physiological symptom severity.
Results: An age-by-diagnostic group interaction was significant only for the DTP group, whose members showed a steeper decline in gCT with increasing age compared to those with 0, 1, or 2 diagnoses. Direct comparison of the DTP group against controls revealed a significant moderation of age by DTP for temporal, posterior cingulate, and occipital rgCT factors. Within the DTP group, there were no significant interactions between age and PTSD/depression severity, pain/sleep symptoms, or lifetime alcohol use accounting for variance in gCT.
Conclusions: Our findings offer compelling support for an association between comorbid clinical disorders, including (but not limited to) mTBI, and disproportional declines in cortical integrity. Although causative inferences cannot be drawn at this time, our continued longitudinal investigation of these veterans may provide insights into the potentially synergistic effects of TBI and polytrauma on brain structure and function.
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G.T. VOELBEL, M. LAZAR, S. WU, G. MERCURI, H. AZMI, C. OGEDEGBE, G. WYLIE & J. FELDMAN. Cerebral White Matter Integrity In Mild Traumatic Brain Injury Adults Predicts Cognitive Deficits: A Longitudinal Study.
Objective: The objective of this study was to explore the relationship of cerebral white matter integrity and cognitive performance in adults with a mild traumatic brain injury (mTBI) at baseline and post-acute phase of injury.
Participants and Methods: Sixteen adults with a mTBI (mean age: 38.5 (12.8) years; 57% males) were recruited from Hackensack University Medical Center Emergency Department. Eighteen healthy adults (mean age: 29.2 (10.7) years; 36.4% males) without a history of a mTBI were recruited for the control group. All participants received a neuropsychological assessment and underwent diffusion tensor imaging for white matter integrity. The mTBI group data collection was within 7 days of the mTBI and 4 months post-injury. The control group received a baseline assessment and 4 months after the initial assessment.
Results: The results demonstrate the baseline right inferior longitudinal fasciculus (R-ILF) radial diffusivity (RD) predicts baseline cognitive deficits: cognitive flexibility (p<.03), executive function (p<.04), and complex attention (p<.003); the baseline right anterior thalamic radiation fractional anisotropy (FA) predicted baseline sustained attention (p<.007); the baseline left cingulum FA predicted baseline working memory (p<.02); the baseline forceps major FA predicted baseline reasoning (p<.01). Only the cingulum FA at baseline predicted cognitive performance at 4-months post-injury: working memory (p<.005) and sustained attention (p<.009).

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Conclusions: The results suggest the effect of specific white matter tract integrity on specific cognitive deficits in the acute and post-acute phases of recovery. Furthermore, the integrity of the cingulum at baseline can be associate with specific cognitive deficits in the post-acute phase of recovery.

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M.J. WALSH, S.F. SORG, K.A. HOLIDAY, M. WERHANE, A.L. CLARK, J.L. SILVERTHORN, V. MERRITT, A.J. WEIGAND, M. BONDI, D. SCHIEHSER & L. DELANO-WOOD. Use of Selective Serotonin Reuptake Inhibitors Moderates the Relationship Between Hippocampal Volume and Verbal Learning in Mild Traumatic Brain Injury.

Objective: Selective serotonin reuptake inhibitors (SSRIs) are frequently prescribed to treat depression and post-traumatic stress following mild traumatic brain injury (mTBI). Given recent work showing that SSRI use correlates with increased hippocampal volume and improvements in cognition, we sought to examine the relationship between these types of medications and cognitive and neurostructural changes in a well-characterized sample of Veterans with head injury histories.

Participants and Methods: 37 mTBI Veterans (SSRI+: n=18; SSRI-: n=19) completed the PTSD Checklist (PCL) and California Verbal Learning Test (CVLT-II), and underwent structural MRI. Bilateral hippocampal volumes were quantified using FreeSurfer and expressed as a percentage of intracranial volume. Linear regression and ANCOVA were conducted in order to examine group differences in hippocampal volume and CVLT performance, as well as to examine the possible moderating influence of SSRI use on these associations.

Results: SSRI+ and SSRI- groups did not differ on age, education, anxiety, or depression; however, they differed on PTSD severity (p=.028). Adjusting for PTSD, compared to the SSRI- group, the SSRI+ group performed better on CVLT learning trials 1-5 (p=.009; η_p^2=.185), and they showed higher bilateral hippocampus volumes (p=.027; η_p^2=.144). Additionally, over and above the effects of PTSD severity, SSRI status moderated the relationship between hippocampal volume and CVLT learning trials 1-5 (p=.023).

Conclusions: Our preliminary results show that, independent of negative mood, SSRI use predicts better verbal learning performance and hippocampal volume within our Veteran mTBI sample. These data implicate a role of the serotonergic system in learning ability after mTBI via circuitry involving the hippocampus. Future prospective research is needed in order to disentangle associations between SSRI use and cognitive and brain health, as well as possible interactions with other commonly prescribed medications (e.g., anticholinergics).

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C.J. WILLMOTT, A.S. MCINTOSH, T. HOWARD, B. MITRA, B. DIMECH-BETANCOURT, J. DONOVAN & J.V. ROSENFELD. SCAT3 Changes from Baseline and Associations with X2 Patch Measured Head Acceleration in Amateur Australian Football Players.

Objective: To investigate changes from baseline on SCAT3 as a result of football game exposure, and association with X2 Patch measured head acceleration events (HAEs) in amateur Australian footballers.

Participants and Methods: Peak linear acceleration (PLA) of the head (>10 g) was measured by wearable head acceleration sensor X2 Biosystems X-Patch® in prospective cohort of male (n = 34) and female (n = 19) Australian footballers. The Sports Concussion Assessment Tool - 3rd Edition (SCAT3) was administered at baseline (B) and post-game (PG).

Results: A total of 1394 head acceleration events (HAE) >10g were measured. Mean and median HAE PLA were recorded as 15.2g (SD = 9.2, range = 10.0 – 115.8) and 12.4g (IQR = 11.0 – 15.6) respectively. No significant difference in median HAE PLA (g) was detected across gender (p = 0.55), however, more HAEs were recorded in males (p = 0.03). Wilcoxon signed-rank tests revealed that players reported a greater number of symptoms PG (p = 0.004) and also greater total symptom severity PG (p < 0.001). On average, symptom severity was rated in the mild range at B (mean rating = 1.57; SD = 0.40). PG, players reported a mean of 3.55 (SD = 4.13) post-concussion symptoms, mostly fatigue (66%), feeling slowed down (34%), headaches (25%) and drowsiness (23%). On average, individual symptoms were rated in the mild range (mean rating = 1.70, SD = 0.52). Whilst there was little evidence of change on the majority of cognitive SCAT index scores, an improvement was demonstrated on the PG SCAT Concentration Index (p = 0.004). No significant association between number of HAE or median PLA, and SCAT3 change scores (p > 0.05 for all), was identified for either gender.

Conclusions: Increase in symptom severity post game was not associated with X-Patch® measured HAE. Males sustained more HAE, however HAE PLA magnitude did not differ across gender. Further work on the validation of head acceleration sensors is required and their role in sports concussion research and medical management.

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C.J. WILLMOTT & P. ASHLEY. Examining the Effects of Exercise and Practice on the SCAT3, and Association Between Mood, Pain & SCAT3 Symptom Report in Athletes.

Objective: This research aimed to examine the influence of exercise and practice on the Sport Concussion Assessment Tool 3 (SCAT3) and King-Devick (KD) performance, and the association between mood, pain and SCAT3 symptom report.

Participants and Methods: The study involved a crossover repeated-measures design across two time periods (T1 & T2). Participants were 16 male and 14 female (M*age* = 22.7 years, SD*age* = 3.6) moderately active non-contact sports athletes, randomly allocated to two groups. An exercise protocol, consisting of five minutes each of skipping and running, was administered at T1 or T2: Group 1 (T1 Exercise present → T2 Exercise absent) and Group 2 (T1 Exercise absent → T2 Exercise present). Primary outcome measures were the SCAT3 and KD.

Results: Exercise did not influence SCAT3 or KD performance. Practice effects were shown on the KD [44.8(7.4) vs 41.2(6.1), P=0.001] but not on SCAT3 cognitive or physical assessments. Mood was positively correlated with symptom reporting, explaining 18.6% of the variance in SCAT3 symptom severity at T1 and 21.2% at T2. The most frequently reported symptoms were 'fatigue or low energy', 'feeling slowed down', 'difficulty concentrating' and 'nervous or anxious'. Pain showed no correlation with symptom reporting.

Conclusions: This study assists in validating the SCAT and KD as sideline assessments for sports concussion by demonstrating a level of robustness to the effects of exercise and practice. Findings also suggest caution is needed when interpreting the SCAT in athletes with mood disturbance. This study highlights the need for further research into potential modifiers of SCAT performance, specifically mood disturbance.

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M.J. WRIGHT, M. MONTI, E.S. LUTKENHOFF, W.D. LOPEZ-HERNANDEZ, A. BICHLMEIER, P. LITVIN, D.J. HARDY, D.F. KELLY, K. GUSKIEWICZ, R. CANTU, P.M. VESPA, D.A. HOVDA, C. WANG, R. SWERDLOFF & J.M. FUSTER. Comparison of Memory Process Disruptions in Single-Impact Traumatic Brain Injury and Repeat Sports-Related Concussive/Subconcussive Injury in Retired NFL Players.

Objective: Repeat sports-related concussion/subconcussive injury (RCSC) is uniquely correlated with an accumulation of hyperphosphorylated tau in the brain that can result in chronic traumatic encephalopathy (CTE), unlike single-impact traumatic brain injury (SI-TBI). However, both RCSC and SI-TBI are related to declines in memory. Our goal was to determine any potential memory differences between RCSC and SI-TBI.

Participants and Methods: Verbal memory function and memory process deficits were assessed in retired NFL players with RCSC (n = 35), moderate-to-severe SI-TBI survivors (n = 35), and healthy controls (n = 20) via the California Verbal Learning Test-2nd edition (CVLT-II) and the Item Specific Deficit Approach (ISDA), respectively. Structural neuroimaging from a subsample of SI-TBI participants (n = 19) was used to identify the neuroanatomical correlates of memory process deficits that distinguished RCSC from SI-TBI.

Results: The RCSC and SI-TBI groups showed poorer learning and recall in contrast to controls, although the RCSC group performed better than the SI-TBI group. In contrast to controls, the SI-TBI group demonstrated difficulties with encoding, consolidation, and retrieval, while the RCSC group evidenced deficits in consolidation and retrieval. Hierarchical regression revealed that delayed recall was primarily predicted by encoding, with consolidation as a secondary predictor in the SI-TBI group. However, in the RCSC group, delayed recall was only predicted by consolidation. Structural imaging indicated that the ISDA consolidation deficit index mapped onto hippocampal atrophy.

Conclusions: We found that RCSC is primarily associated with consolidation deficits, which differs from SI-TBI. Given the role of hippocampus in memory consolidation and the fact that hyperphosphorylated tau tends to accumulate in the medial temporal lobe in the later stages of RCSC-related CTE, the ISDA consolidation deficit index may be a cognitive marker of potential CTE risk in retired contact sports athletes.

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S.L. MARTINDALE, R.D. SHURA, J.A. ROWLAND, H.M. MISKEY, E.L. EPSTEIN & A.J. JAK. Blast Exposure: Cognitive, Biological, and Behavioral Effects Beyond TBI.

Military service often results in exposure to a multitude of different blast forces throughout training, deployment, and combat. Effects of blast on the brain have been only recently studied, and exposure may occur with or without acute symptoms indicative of a TBI. It is important to understand the potential sequelae of such exposures and the circumstances that lead to negative outcomes beyond TBI history. This symposium will first present a new interview method for evaluating lifetime blast exposure. Using the interview to identify presence and severity of blast exposure, results will be presented describing the effect of exposure on functional brain networks, neuropsychological outcomes, development of PTSD, and recovery from PTSD. A strength of these presentations is the comprehensive nature of evaluations from a cross-sectional study investigating biological and behavioral effects of blast exposure. Participants (N = 280) completed diagnostic interviews, questionnaires, and cognitive testing. Eligible participants (n = 164) completed neuroimaging, including magnetoencephalography and magnetic resonance imaging. The predominant theme of results across presentations is that, as severity of blast exposure increases, the likelihood of negative outcomes also increases. These presentations demonstrate that blast exposure can affect individuals across a variety of outcomes, from altering brain function to confounding patterns of recovery from PTSD, with associations often emerging only at higher severity of exposure. Blast exposure remained related to outcomes beyond the effects of these other variables. This demonstrates the robustness of the relationship and the importance of considering blast exposure history, beyond the effects of TBI history, in evaluations of physical and mental health of post-deployment veterans. Discussant will synthesize data presented and confer similarities and differences as blast relates to TBI literature.

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S.L. MARTINDALE. Effects of Blast Exposure on Cognition beyond PTSD and TBI.

Objective: The present analysis aimed to determine if blast exposure: 1) is associated with cognitive outcomes beyond PTSD and TBI, and; 2) exacerbated effects of PTSD and TBI on cognitive outcomes.

Participants and Methods: Post-9/11 veterans (N = 280) participated in a cross-sectional study investigating the effects of blast exposure on cognition. Participants completed the Wechsler Adult Intelligence Scale (WAIS-IV), Trail Making Test (TMT), Controlled Oral Word Association Test (COWAT), and standalone performance validity tests (PVTs). Current PTSD diagnosis, deployment TBI history, and blast exposure (pressure rating of 3 or greater) were evaluated by the Clinician Administered PTSD Scale (CAPS-5), MA-MIRECC TBI Interview, and the Salisbury Blast Exposure Interview, respectively.

Results: Veterans who passed PVTs (n = 232) were included in analyses. Participants were mostly male (84.48%) and between the ages of 26-69 (M = 41.72, SD = 9.87). Deployment TBI history was present in 77.78% Veterans, 30.87% had a current PTSD diagnosis, and 33.62% were blast exposed. Hierarchical linear regression indicated that blast exposure was not independently associated with outcomes beyond PTSD or TBI (p = .123–.974). A significant interaction effect was seen between deployment TBI history and blast exposure on TMTA (B = -11.02, p = .001) beyond independent effects. Probing indicated that lower performance on TMTA in Veterans with TBI (B = -2.63, p = .158) was contingent upon the presence of blast exposure (ΔR^2 = .05, $F(1,201)$ = 10.84, p = .001).

Conclusions: Though blast exposure was not independently associated with cognitive outcomes, it significantly exacerbated the effects of TBI on attention. Veterans who incur a TBI and have significant blast exposure during deployment may experience persisting difficulties with cognitive functioning due to alterations in basic attention abilities. Blast exposure should be considered in etiology of cognitive complaints in this population.

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R.D. SHURA. The Salisbury Blast Exposure Interview.

Objective: Describe and evaluate a new structured interview for assessing blast exposure, the Salisbury Blast Exposure Interview (SBEI).

Participants and Methods: A subsample of post-deployed veterans (n = 178) from a larger study on primary blast were used for initial analyses. Other methods of blast assessment are limited in several ways, including: only a few events rated, only combat events rated, or reliance on distance or TBI symptoms to define blast. The SBEI is unique in that it evaluates all exposures both during and outside of military service and assesses the individual's physical experiences of the blast (wind, debris, ground shaking, pressure, heat, and noise) using a Likert-based rating with behavioral anchors.

Results: Nearly all participants (90.4%) reported one or more blast exposures. Most (70.5%) occurred during combat, and 33.7% resulted in a TBI. Experience ratings were significantly lower for pressure ($p < .001$), temperature ($p < .05$), and sound ($p < .001$) if individuals were behind cover. Ratings of wind, debris, ground shaking, pressure,

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heat, and noise were significantly higher (all $p < .001$) if the event led to a TBI. Self-rated pressure was the strongest predictor of resulting TBI (AUC = .75). Pressure (OR = .72), temperature (OR = .67), and distance from blast (OR = 1.01) were all significant predictors of an event resulting in a TBI.
Conclusions: The large number of exposures to blasts during the recent wars makes characterizing these events critical. The SBEI is the first comprehensive interview of blast exposure across the lifespan. Results demonstrate experience ratings fluctuate in the expected manner with protective factors. Ratings of pressure were the best predictor of resulting TBI; however, heat and distance were also related. The SBEI shows promise as a useful tool to more precisely measure blast exposure that can be applied in both clinical and research contexts.
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J.A. ROWLAND. The Effect of Blast Exposure on Functional Brain Networks.
Objective: To determine the effect of blast exposure, TBI, and PTSD on functional brain networks in post-deployment combat-exposed veterans.
Participants and Methods: Participants included 115 combat-exposed, post-deployment veterans. Participants completed both functional MRI (fMRI) and magnetoencephalography (MEG). Current PTSD diagnosis, deployment TBI history, and blast exposure were evaluated by the Clinician Administered PTSD Scale (CAPS-5), MA-MIRECC TBI Interview, and the Salisbury Blast Exposure Interview, respectively. fMRI was available for all participants, MEG was available for a sub-sample (n=40). Between group differences in network metrics were evaluated using the GLM procedure. Comparisons of MEG outcomes adjusted for age and estimated premorbid IQ, whereas comparisons of fMRI outcomes adjusted for age, education, BMI, and sex. Analyses were conducted examining effects of any blast exposure and higher severity blast exposure.
Results: There were no differences in network metrics related to blast exposure or history of deployment TBI, and no interactions with PTSD for either fMRI or MEG network metrics. However, higher severity blast exposure was associated with higher levels of clustering coefficient (p=.025) and small-worldness (p=.034) in MEG data, independent of deployment TBI status. No interactions with PTSD diagnosis were observed for MEG data. Higher severity of blast exposure was also associated with differences in fMRI metrics of clustering coefficient (p=.007), local efficiency (p=.01), global efficiency (p=.008), and assortativity (p=.012), with significant interactions with PTSD diagnosis for each variable.
Conclusions: These results demonstrate that exposure to higher severity blasts is associated with altered network metrics independent of deployment TBI history. The lack of association with lower severity blast exposures suggests the potential for effects on network metrics increases with blast severity (i.e., increasing pressure waves).
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H.M. MISKEY & J.A. ROWLAND. Blast Exposure as a Risk Factor for PTSD.
Objective: To investigate blast exposure as a risk factor for PTSD.
Participants and Methods: Post-9/11 veterans completed the Structured Inventory of Malingered Symptomatology (SIMS), MA-MIRECC TBI Interview, and the Salisbury Blast Exposure Interview as part of a larger study. Clinician Administered PTSD Scale (CAPS-5) assessed current and lifetime PTSD. Chi-squared analyses and logistic regressions evaluated aims. **Results**: Only participants passing the SIMS (score >24) were included (N=172). Severity of blast exposure was a categorical variable defined by the level of observed pressure change (e.g., slight but not uncomfortable, moderate resulting in minor pain). Participants were primarily Caucasian (52.91%) males (85.47%) between the ages of 26-69 (M=41.66, SD=10.12) with an average of 15 years of education (SD=2.06). Average years since deployment was 9.31 (M=3396.38, SD=1353.98 days). TBI during deployment was reported by 77 participants, 115 reported blast exposure; 63 participants reported both TBI and blast exposure. Lifetime PTSD was present in 102 participants; 44 met current criteria. Blast exposure was associated with higher rates of current (χ^2=4.94, p=.026, Φ=0.17) and lifetime (χ^2=14.47, p<.001, Φ=0.30) PTSD. Higher-severity blast exposure was associated with both current (χ^2=12.72, p<.001, Φ=0.28) and lifetime (χ^2=9.33, p=.002, Φ=0.24) PTSD. TBI was associated with higher rates of lifetime (χ^2=12.55, p<.001, Φ=0.28), but not current (χ^2=3.13, p=.077, Φ=0.14) PTSD. After excluding participants with TBI, blast exposure remained associated with lifetime (χ^2=12.72, p<.001, Φ=0.38), but not current (χ^2=2.84, p=.092, Φ=0.18) PTSD. Higher-severity blast exposure remained associated with both current (χ^2=5.72, p=.017, Φ=0.25) and lifetime (χ^2=4.60, p=.032, Φ=0.23) PTSD. **Conclusions**: Blast exposure is related to increased rates of PTSD, independent of TBI. More severe blast exposure is related to higher rates of PTSD. Implications will be discussed.
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E.L. EPSTEIN. Blast Exposure and PTSD Recovery.
Objective: The purpose of this study was to determine how blast exposure confounds the relationship between PTSD recovery and behavioral health outcomes.
Participants and Methods: Post-9/11 veterans (N = 280, 85.5% male) participated in a cross-sectional study investigating the effects of blast exposure on behavioral health. Trauma burden (DTS; PCL-5), depressive symptoms (PHQ-9), alcohol use problems (AUDIT), sleep quality (PSQI), physical symptoms, pain (PROMIS-PI), quality of life (QOLIBRI), blast exposure (SBEI), PTSD (CAPS-5), and symptom validity (SIMS) were assessed. PTSD recovery was defined as having lifetime history of PTSD, but not meeting current criteria. Veterans who passed symptom validity measures (n = 248) were included in analyses. MANOVA was used evaluate main and interaction effects between PTSD recovery, blast exposure, and outcomes.
Results: Blast exposure were associated with PTSD recovery (p = .019) such that the higher the pressure wave the less likely PTSD recovery. There was a main effect for PTSD recovery resulting in lower pain (p < .001), depression (p < .001), physical symptoms (p < .001), better sleep quality (p = .008) and quality of life (p = .003 – .042) outcomes. Significant interaction effects between blast exposure and PTSD recovery were present for alcohol use problems (p = .036) and aspects of quality of life (p = .001 – .021), such that if the blast exposure was related to trauma then alcohol use problems were greater, and quality of life was poorer.
Conclusions: Veterans with PTSD recovery experienced better behavioral health outcomes than those without recovery. Experience of moderate blast exposure resulted in less likelihood of PTSD recovery and was associated with greater alcohol use and poorer quality of life in veterans without recovery. These results suggest that blast exposure should be considered in the etiology of behavioral health symptoms and when treatment planning.
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W. LAI, H. HSU, Y. TSAI, S. XIAO, S. HUANG & C. YANG. Longitudinal work quality of patients with post-concussion symptoms.
Objective: Post-concussion symptoms are not uncommon after mild traumatic brain injury (MTBI). 'Return to work' (RTW) is one of the most critical outcomes after MTBI, but information concerning with the long-term RTW following MTBI is still limited. This study thus aims to show the 'work quality' (WQ) simultaneously involving with 'work

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status' and 'work stability', and to further examine the associations between the long-term WQ and influencing factors.
Participants and Methods: A total of 110 patients with MTBI was recruited in this retrospective study. PCS and WQ after six months post-injury (M= 2.9 years; SD= 1.29) following MTBI were evaluated. In addition, the clinical variables, demographic variables, PCS, neurocognitive functions, emotional states and WQ at 2 weeks, 1 month, and 3 months post-injury, were also associated with patients' long-term WQ and PCS.
Results: No statistically siginificant differences of PCS between the MTBI patients and healthy participants after six months were showed, while the WQ had siginificantly improved at 3 months post-injury. Secondly, the cognitive symptoms at 1 month post-injury could well predict long-term WQ. Thirdly, PCS of patients with unfavorable WQ were significantly worse than those with favorable WQ at 2 weeks and after six months. Finally, the patients with more PCS had more unfavorable WQ, and Most importantly, the long-tern WQ siginificantly correlated with the acute emotional distress, dizziness and psychomotor slowing.
Conclusions: This study uncovered that emotion distress and some specific PCS, such as dizziness and psychomotor slowing, were significantly associated with WQ after six months. In addition, it demonstrated that cognitive symptoms at 1 month post-injury were the most effective predictor for long-term WQ. Thus, clinicians can provide interventions for patients with PCS and emotional disturbance at early stage to promote long-term WQ.
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Concussion/Mild TBI (Child)

B.L. BROOKS, A. MIKROGIANAKIS & K.M. BARLOW. Sleep Disruption After Concussion in Adolescents: Characterization and Trajectory Over Time.
Objective: Sleep problems are a common but treatable symptom after concussion. The aim of this study was to characterize the type and trajectory of sleep disruption from injury to 3 months.
Participants and Methods: Participants were 175 adolescents 13-18 years (M=15.1, SD=1.3; 62% male) who presented to the emergency department (ED) due to concussion. Sleep symptoms were rated using the Post-Concussion Symptom Inventory (PCSI) and obtained in the ED for pre-injury (parents only) and then at 7-10 days, 1 month, 2 months, and 3 months post-injury.
Results: Pre-concussion parent ratings suggested 1 or more symptoms of sleep disruption in 52% of adolescents. Factor analyses supported separate somnolence (i.e., sleeping more than usual, drowsiness, fatigue) and deprivation (i.e., sleeping less than usual, trouble falling asleep) composites post-concussion. Somnolence rates increased significantly from pre-injury (40%) to 7-10 days (51%, p<.001). By 1-month the rate somnolence symptoms was equivalent to baseline (31%, p=.07) and then significantly improved by 2-months (24%, p=.001) and 3-months (19%, p=.001). Adolescents had high somnolence symptoms at 7-10 days (80%), which improved significantly by 1 month (49%, p<.001), 2-months (41%, p<.001), and 3-months (39%, p<.001). Sleep deprivation was reported for 42% of adolescents prior to the injury (parent report), with significant improvement at 7-10 days (28%, p=.005), 1 month (27%, p<.001), 2 months (19%, p<.001), and 3 months (16%, p<.001) compared to baseline. Over half of adolescents endorsed sleep deprivation at 7-10 days (54%), with significant improvement at 1 month (44%, p=.002), 2 months (35%, p<.001), and 3 months (37%, p<.001).
Conclusions: Sleep symptoms are present in half of adolescents prior to concussion. Somnolence, including excessive sleep, drowsiness, and fatigue, increase sub-acutely but resolve by 1 month post-injury. Sleep deprivation may not be as problematic over the first 3 months of recovery.
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P. SAYERS, S. VIRANI, A. RAJARAM, M. SOHN, C. LO, N. ZIVANOVIC & B.L. BROOKS. Insomnia Ratings in Adolescents with Slow Recovery From Concussion.
Objective: The aims of this study were (1) to quantify sleep disruption in adolescents with poor recovery from concussion and (2) to investigate associations between sleep disruption and post-concussive symptoms, psychological distress, and cognitive functioning.
Participants and Methods: Adolescents 13-18 years old (N=109) experiencing slow recovery after concussion completed sleep ratings using the Insomnia Severity Index (ISI). The ISI is a 7-item rating scale completed by adolescents to measure insomnia (none, 0-7; subthreshold, 8-14; moderate, 15-21; or severe, 22-28). Post-concussion symptoms (raw scores from the Post-Concussion Symptom Inventory; PCSI), depression and anxiety symptoms (T scores from the Behavioural Assessment System for Children, Second Edition; BASC-2), and cognitive abilities (standard scores from CNS Vital Signs; CNSVS) were also obtained.
Results: Mean age was 16.2 years (SD=1.2) and they were 6.1 months (SD=3.6) post-injury. Mean total ISI score was 11.5 (SD=5.9) and 33% endorsed insomnia (30.3% had moderate insomnia; 2.8% had severe insomnia). Worse insomnia was associated with more post-concussion symptoms [PCSI parent-report domain scores (physical rho=0.35, p=0.0001; emotional rho=0.28, p=0.005; cognitive rho=0.32, p=0.001), and PCSI self-report domain scores (physical rho=0.40, p=0.0001; emotional rho=0.42, p=0.0001; cognitive rho=0.45, p=0.001)]. It was also related to worse anxiety (self-report rho=0.39, p=0.0001; parent-report rho=0.28, p=0.004) and worse depression (self-report rho=0.42, p=0.0001; parent-report rho=0.28, p=0.004). Finally, sleep disruption was correlated with poorer cognitive functioning (CNSVS Complex Attention rho=-0.23, p=0.02).
Conclusions: One-third of adolescents with slow recovery from concussion have sleep disruption. Sleep disruption was related to more post-concussive symptoms, psychological distress, and cognitive problems. The present study suggests that treatment of sleep issues should be a priority in this understudied population.
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N. DESIRE, V. PLOURDE & B.L. BROOKS. Predicting headache before and after neuropsychological testing in youth with protracted recovery from concussion.
Objective: Headache is the most common and debilitating symptom after concussion and can cause trepidation about completing intense cognitive activity. However, predictors of headaches in pediatric concussion, particularly after cognitive testing, are understudied. Our aim was to examine pre-injury, injury, and post-injury predictors of headache severity in youth with protracted concussion recovery who undergo neuropsychological testing.
Participants and Methods: Youth (N=142; 6-17 years, M=14.9 years, SD=2.7; 58.5% female) were assessed at M=6.9 months post-injury (SD=5.3). Headache Rating Scale (HRS) measuring headache severity on an 11-point Likert scale (0-10) was completed by youth before and after cognitive testing (M=86.1 minutes, SD=21.5). Univariate analyses were first performed to identify potential pre-injury, (e.g., age, sex, prior history of headaches, learning, attention or psychological concerns, number of concussions), injury (e.g., presence of post-traumatic amnesia [PTA] and loss of consciousness [LOC]), and post-injury (e.g., family stress, post-concussive symptoms [PCS] excluding headaches, anxiety, depression, time since injury, length of cognitive testing, validity testing)

predictors, which were then entered into hierarchical regression models to predict HRS scores before and after cognitive testing.
Results: HRS before (M=2.4, SD=2.4) and after testing (M=3.6, SD=2.9) were predicted by female sex and parent-rated somatic PCS. Age, family stress, symptom burden, and validity failure also contributed to these models. However, when headache severity prior to testing was added to the post-test regression, this alone predicted severity of headache after cognitive testing.
Conclusions: Headache severity in youth with poor recovery is predicted by female sex and higher somatic symptoms. Headache severity after neuropsychological testing is best predicted by headache severity before testing even starts, supporting that intense cognitive activity does not predict headache severity.
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S.T. CABLE, J. O'NEILL, D. COBB, E. SWANSON-KIMANI, L. SARRETT, M. COX, N. SHEEHAN, J. JOHNSON, D. FERGUSON, K. MCCOLLOUGH, J. ORTEGA, M. ELLERBUSCH, S. SURESH & L. DREER. SCAT3 Symptom Clusters and Associations with Neuropsychological Functioning and Return-to-Learn Following Youth Concussion.
Objective: To determine how severity of symptoms within clusters: physical, cognitive, sleep-related, and emotional on the Sports Concussion Assessment Tool (SCAT3) are associated with neuropsychological measures and return-to-learn outcomes.
Participants and Methods: Prospective, longitudinal cohort study. 69 concussed youth (*M*= 15.1 years, *SD*= 1.5; 58% male; 68.1% white) were enrolled from sports medicine clinics mean 8.3 days from injury. Participants completed the SCAT3, memory task (California Verbal Learning Test [CVLT]), measure of attention (Conner's Continuous Performance Test–3rd Edition [CPT]), and measures of processing speed and executive functioning (Trail Making Test [TMT], Symbol Digit Modalities Test [SDMT]).
Results: Physical cluster scores were significantly associated at $p < .05$ with SAC Immediate Memory, SCAT3 Balance Errors, CVLT Trial 1, CVLT Total Learning Slope, TMT A, SDMT Written, SDMT Oral. The cognitive cluster was not significantly correlated with any measures. CVLT Total Learning Slope, Short Delay Free Recall, Short Delay Cued Recall, and Long Delay Cued Recall were associated with the sleep-related cluster, along with SCAT3 Balance Errors. Both SDMT Written and Oral were significantly correlated with the sleep-related cluster (r= -.417, r = -.326) and emotional cluster (r= -.255, r=-.245). The physical (r=.323), sleep-related (r=.315), and emotional (r=.273) clusters were significantly associated with days to return-to-learn.
Conclusions: This research adds to the literature supporting greater symptom severity resulting in longer concussion recovery. Symptom severity with the cognitive cluster, which might be expected to affect performance on neuropsychological testing, was not associated with measures, indicating subjective reports cognitive symptoms may not reflect real life functioning. These results emphasize the need for neuropsychological testing following concussion.
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A.L. CLARK, A.J. WEIGAND, K.J. BANGEN, V. MERRITT, S.F. SORG, D. SCHIEHSER, M. BONDI & L. DELANO-WOOD. Older age is associated with reduced regional CBF in regions vulnerable to Alzheimer's disease in military veterans with mild TBI.
Objective: Mild traumatic brain injury (mTBI) is a risk factor for poor long-term functional and cognitive outcomes, especially in the context of aging. Given recent research suggesting that TBI may in large part represent a vascular event, coupled with observations of altered cerebral blood flow (CBF) in both mTBI and aging, we sought to examine the interactive effects of age and mTBI history on CBF dynamics in a well-characterized sample of Veterans with history of mTBI.
Participants and Methods: 81 Veterans (54 mTBI; 31 Military Controls [MCs]) underwent neuroimaging and completed psychiatric symptom inventories. Resting CBF was measured using multiphase pseudocontinuous arterial spin labeling and averaged across FreeSurfer-derived parcellations of key frontal, temporal, and parietal regions known to be affected in aging. Multiple linear regression examined the interactive effects of mTBI and age on regional CBF while adjusting for age, sex, and symptoms of posttraumatic stress.
Results: Regression analyses revealed significant Group x Age interactions for resting CBF of the right entorhinal cortex ($p = .03$), inferior temporal gyrus ($p = .01$), lateral orbitofrontal cortex ($p = .02$), and left pars opercularis ($p = .04$). Examination of simple main effects revealed that increased age was significantly associated with decreased CBF in those with mTBI, but not in the MC group. A trend level association was observed for the left orbitofrontal cortex [$p = .05$]) and inferior temporal gyrus ($p = 0.06$).
Conclusions: In our sample of head-injured Veterans, results showed that history of mTBI is associated with greater age-related reductions of CBF in AD vulnerable regions. These findings suggest that CBF alterations may underlie deleterious pathological processes (e.g., biochemical cascades, disconnection) that give rise to poor long-term neurobehavioral outcomes in those with history of head trauma.
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G.L. IVERSON, N.E. COOK, I.G. GILMAN, B.A. MAXWELL, R. MANNIX, R. ZAFONTE, P.D. BERKNER & B.L. BROOKS. Multiple Past Concussions in High School Hockey Players: Examining Cognitive Functioning and Symptom Reporting.
Objective: To investigate if there are meaningful differences in baseline preseason cognitive functioning or symptom reporting between high school ice hockey players with and without a history of prior concussions.
Participants and Methods: Participants were 1,616 male high school ice hockey players (mean age=15.6, SD=1.5 years) from Maine who completed baseline testing between 2009 and 2015. Athletes were grouped according to their self-reported concussion history [0 (n=1,136), 1 (n=321), 2 (n=112), or 3+ (n=47) previous concussions]. Cognitive functioning was measured by the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT®) battery and symptom ratings were obtained from the Post-Concussion Symptom Scale (PCSS).
Results: There were no statistically significant differences between groups in cognitive functioning as measured by ImPACT®. There was no significant difference between groups on the PCSS total score. In a multivariate model, prior treatment for headaches, prior treatment for a psychiatric condition, and prior treatment for substance/alcohol use all significantly predicted symptoms, with concussion history being the weakest independent predictor.
Conclusions: There were few meaningful differences between male high school ice hockey players with and without a history of prior concussions. Players with a history of prior concussions did not differ from players without prior concussion on cognitive testing or their total symptom ratings. Health history factors were more strongly associated with symptom reporting than concussion history.
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C. GAUDET & A. MCNALLY. Immediate Post-Concussion and Cognitive Testing (ImPACT) Discriminant Utility of Regression-Based Approaches in Appraising Intraindividual Differences.

Objective: The present study investigated the discriminant utility of Immediate Post-Concussion and Cognitive Testing (ImPACT) in differentiating between healthy individuals and those with a recently sustained concussion.

Participants and Methods: This archival chart review examined ImPACT protocols for 222 adolescents who completed baseline testing between 2009 and 2017. The sample consisted of 93 adolescents who sustained a concussion, and 129 healthy adolescents who did not. Standardized regression-based procedures were used to calculate predicted composite scores on retesting. Obtained scores (either post-injury or second baseline) were compared to predicted scores to generate standardized discrepancy scores (SDS). SDS were analyzed to appraise the discriminant utility of the composite scores both in isolation and combination.

Results: Intraindividual analyses, using discriminant function analysis (DFA), yielded sensitivity values ranging from 59.1 to 64.5; specificity values ranging from 81.4 to 90.0; and overall classification accuracy ranging from 74.3 to 77.5. Total Symptom Score (TSS) in isolation resulted in the highest specificity (90.0) and classification accuracy (77.5), but lowest sensitivity (59.1). The DFA that included a combination of all composite scores resulted in the highest sensitivity (64.5), but lowest specificity (81.4) and classification accuracy (74.3).

Conclusions: Results provide insight into ImPACT's utility in differentiating between healthy individuals and individuals with concussion. Intraindividual SDS analyses yielded low sensitivities, raising concerns regarding ImPACT's utility in detecting the presence of cognitive symptoms in adolescents with concussion. Moreover, given the slight difference in classification accuracy between a single self-report score (TSS, 77.5) and a combination of all composite scores (74.3), the incremental validity of the cognitive performance-based index scores warrants further investigation.

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E.H. GERST, M.D. SADY, K.E. MCCARTHY, S.E. RENBERG, J. AXELOWITZ & G.A. GIOIA. Depressed, Anxious, and Tired: Reporting of Post-Concussion Fatigue in Adolescents with Anxiety and Depression.

Objective: Fatigue is a common complaint following concussion, but is also experienced in uninjured adolescents experiencing anxiety and depression. This study aims to examine the role of premorbid anxiety and/or depression on reports of fatigue amongst adolescents during concussion recovery.

Participants and Methods: Participants were uninjured (n=363) and injured (n=582; Concussion only n=486; Concussion Plus n=96) adolescents (Age M=14.84, SD=1.41; Days from injury M=15.24, SD=7.17). Injured participants were identified as 'Concussion Plus' if they had parent-reported history of anxiety and/or depression. Participants completed the Pediatric Quality of Life Inventory (PedsQL). Outcome variables are self-report mean rating on General, Sleep, and Cognitive factors. MANOVA, ANOVA, chi-square, and t-tests examined differences between groups.

Results: A significant effect of group was found on fatigue reporting for all three factors F (6, 1648) = 14.53, $p < .001$. Cohen's d effect sizes between all three groups ranged from 0.37-1.32. Significant effect of gender (χ^2=44.90, p <.001) was found on fatigue reporting for the General and Cognitive factors, but not for the Sleep factor. Groups differed in their mean age, but effects of age were noncontributory. When retrospective pre-injury reporting was considered for the Concussion and Concussion Plus groups, significant differences were not found between the two groups ($p > .05$).

Conclusions: Premorbid anxiety and/or depression are risk-factors for higher rates of post-concussion fatigue in adolescents, and males and females differ in their post-concussion fatigue reporting. However, the severity of adolescent post-concussion fatigue must be considered within the context of their pre-injury experience of fatigue (retrospective reports) and premorbid risk factors.

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G.A. GIOIA & O. TATE. Clinically Meaningful Reliable Change Metrics for Concussion Subtypes in Youth.

Objective: To generate a set of clinically meaningful reliable change indices for detection and tracking of concussion subtypes in youth

Participants and Methods: Participants were 235 uninjured youth (5-18) in 3 age groups (Age 5-7 n=52, 8-12 n=81, 13-18 n=102) who completed the age-specific Post-Concussion Symptom Inventory (PCSI; Sady et al., 2014) twice (Retest intervals (Mean(SD) days): 5-7 M=7.48 (1.8), 8-12 M=7.64 (2.0), 13-18 M=6.20 (1.61). Raw scores for the available PCSI symptoms were assembled into six subtype clusters described in (Collins et al.,2014)- migraine (5 items), ocular-motor (2 items), vestibular (3 items), cognitive (4 items), emotional (4 items), sleep (4 items). Means, standard deviations were generated for the two sets of ratings and test-retest reliabilities were calculated for each of the subtype clusters to produce reliable change indices (RCI) at the 80% and 90% confidence intervals.

Results: RCI tables were generated for the PCSI subtype clusters (raw scores) for each of the three age-specific PCSI symptom subtypes (e.g., Age 13-18 80%/ 90% CI: Migraine=3/3, Ocular-motor =1/2, Vestibular =2/2, Cognitive=3/4, Emotional=2/3, Sleep=3/4).

Conclusions: This study provides reliable change metrics for use by clinicians and researchers to define clinically meaningful change in the recently proposed concussion subtypes in youth. These RCIs can quantify clinically meaningful post-concussion symptom change in children and adolescents, which may allow a more differentiated approach to treatment planning (Collins et al., 2016). Future directions in this work include expanding the symptom sets within each subtype to be maximally inclusive and predictive, include parent symptom ratings, and examine the natural recovery progression of each subtype.

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J.E. KARR, N.E. COOK, D.P. TERRY, B.A. MAXWELL, R. ZAFONTE, P.D. BERKNER & G.L. IVERSON. Concussion History and Subacute Symptom Severity Among High School Athletes.

Objective: There is concern that athletes with prior concussions may take longer to recover from a subsequent concussion, but the relationship between a personal history of concussion and post-concussion symptom severity following a new concussion remains unclear. This study examined whether a history of prior concussion was associated with greater subacute symptom severity.

Participants and Methods: Participants were 588 student athletes aged 13 to 18 years (M=15.50±1.29; 52.9% boys) who had a suspected concussion and self-rated their post-concussion symptoms 7-21 days post injury using the Post-Concussion Symptom Scale in ImPACT®. The sample included athletes with no prior concussion (n=437), 1 prior concussion (n=108), or ≥2 prior concussions (n=43), predating the new index injury. Athletes were compared on the severity of 22 symptoms using Mann-Whitney U tests.

Results: Comparing groups on total symptom burden, differences trended toward significance. Athletes with ≥2 prior concussions had a lower mean total score (M=7.81) than athletes with no prior (M=11.05, p=.071) or 1 prior concussion (M=11.55, p=.072). Athletes with no prior concussions did not differ from athletes with 1 prior concussion on ratings of any individual symptom. Athletes with 1 prior concussion endorsed higher sleep-related symptoms than athletes with ≥2 prior concussions (trouble falling asleep, p=.031; sleeping less than usual, p=.022; drowsiness, p=.040). Athletes with no prior concussions had

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higher symptom ratings than athletes with ≥2 prior concussions in vomiting (p=.041), trouble falling sleep (p=.019), and sleeping less than usual (p=.004).
Conclusions: All groups endorsed mild subacute symptoms. Athletes with no prior concussions or 1 prior concussion did not differ in symptom ratings; however, both groups tended to endorse higher symptoms than athletes with ≥2 prior concussions, especially related to sleep difficulties. Counterintuitively, athletes with more prior concussions endorsed fewer subacute symptoms following a new concussion.
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V. KWAN, M. VO, M. NOEL & K. YEATES. A Scoping Review of Pain in Children Following Traumatic Brain Injury: Is There More Than Headache?
Objective: Headache is a common source of pain in children following traumatic brain injury (TBI); however, little is known about non-headache pain in this population. The present scoping review sought to map the extant literature to determine what is known about non-headache pain in children following TBI of all severities.
Participants and Methods: We performed a search of seven databases, including studies published through October 2016. A study was included if: (1) it was specific to the pediatric population, (2) participants had a history of TBI, and (3) it provided quantitative or qualitative information about pain. Studies were screened by two independent reviewers (VK and MV) in three stages (title, abstract, and full text screen).
Results: Of 109 studies published on pain in children following TBI, 95 (87%) were focused exclusively on headache and only 14 (13%) reported on non-headache pain or overall pain, with half (n = 7) in the form of case studies. Overall, the level of evidence was low, with only three high-quality prospective studies. In one study, over half (57.1%) of adolescents with persistent pain following TBI reported pain in multiple body sites (e.g. back, lower limb, neck; Tham et al., 2013). In another study, for each additional pain site aside from the head, the risk for chronic migraine was also increased (Scher et al., 2017). These findings would indicate the importance of documenting the different types of pain comprehensively in this clinical population. Nevertheless, pain in body regions other than the head is often not assessed systematically in pediatric TBI research.
Conclusions: Pain assessment in children after TBI is important, given that pain is linked to worse recovery, poorer quality of life, and can be long-lasting. More rigorous research on non-headache pain and its role in impeding recovery in children following TBI is imperative, and has the potential to improve the care and management of children with TBI.
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J. LAURENDEAU-MARTIN, C. BEAUDOIN, N. DÉSIRÉ, A. IBRAHIM & M. BEAUCHAMP. Preliminary Validation of the REACTIONS Questionnaire: a Post-Concussive Symptoms Checklist for Early Childhood.
Objective: Traumatic brain injury (TBI) is highly prevalent in children under 6 years of age. Young children may be particularly vulnerable to TBI given early childhood is a pivotal period for brain development. Post-concussive symptoms (PCS) are common after TBI and may affect physical (e.g., headache, sleep), cognitive (e.g., memory, concentration) or behavioral (e.g., irritability, anxiety) domains. Evaluation of PCS is crucial for adequate medical follow-up, but is a challenge in young children given their limited verbal abilities. Young children may also manifest symptoms differently than older children. There is currently no validated PCS measure for young children. To address this, the Report of Early Childhood Traumatic Injury Observations & Symptoms questionnaire (REACTIONS) was designed to document the presence and severity of PCS and their associated manifestations in children 6 years and under. The aim of this study was to provide preliminary validation information for this new tool.
Participants and Methods: Children 0-6 years (N=30) with TBI were recruited in the emergency department of a tertiary urban hospital. Parents completed REACTIONS within 48 hours, 1-week and 1-month post-TBI.
Results: Preliminary analyses suggest adequate internal consistency (α>0.70) in 9 of the 16 REACTIONS subscales, and near acceptable consistency in 5 subscales (0.699<α>0.500). Only two subscales did not reach the consistency threshold (α< 0.500). Pruning of problematic items was incepted and showed that most inadequate items consisted of questions more appropriate for verbal children.
Conclusions: These first validation steps suggest that the REACTIONS questionnaire shows promising internal consistency and confirms the relevance of developing a specific tool to reliably assess PCS in young children.
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R.K. LAW, K. LOWERY & A. DYE. Adolescent's Percieved Concussion Symptoms and Executive Functioning: Can we Trust Self-Reported Deficits?
Objective: Traumatic Brain Injury (TBI) is the leading cause of death and disability for children and adolescents leading to deficits in cognition, physical, and emotional functioning. Of particular interest for this study are the impacts of concussion on attention and executive functioning (EF) skills including planning, organizing, set-shifting, and self-regulation. Currently, the most widely used concussion recovery guidelines, or Return-to-Learn, emphasize a gradual transition back to strenuous cognitive and physical activity based on abatement of an individual's symptoms. Due the individual nature of post-concussion recovery plans, it is important that symptom reporting is reflective of actual deficits.
Participants and Methods: Participants in this study include 40 (15 male, 25 female) adolescents (age range: 10-21 years; mean: 15.33 years) who presented at an outpatient neuropsychological practice due to symptoms of a TBI. Data was analyzed to determine whether severity of perceived symptoms (at time of TBI/time of testing) predicted performance on measures of attention and EF. Measures include the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) self-report of TBI symptoms, CPT-3, the Stroop Color/Word task, the Rey Complex Figure Task (RCFT), and Trails.
Results: The researchers found that adolescents' self-reported symptoms of a TBI (ImPACT; ranged 1 to 103) were not correlated with actual neuropsychological deficit on tests of attention/EF, regardless of severity. This indicates that self-report measures may not be accurate in identifying ongoing attentional concerns for Return-to-Learn protocols.
Conclusions: Implications for the over-reporting of symptoms will be discussed in TBI recovery programs. This may be indicative of the feigning of symptoms, which would undermine the validity of testing as well as complicate treatment reliant on self-reported symptoms. The use of objective neuropsychological evaluations to identify real deficits is recommended for individuals recovering from a TBI.
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E. ROSS, K. BARROS & M. LAVOIE. Mood Disturbance and Pediatric Concussion Recovery: Does it Depend on Age, Sex, or Type of Injury?
Objective: To examine the relation between mood disturbance and pediatric concussion recovery, and the moderating effect of age, sex, and type of injury.

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Participants and Methods: Retrospective chart review was completed for 89 patients. Neuropsychological assessment and clinical diagnostic interview determined concussion screening outcome (34 Failed/55 Passed). Patients completed the Beck Youth Inventories, Second Edition (BYI-II); *t*-score data from the Self-Concept, Anxiety, and Depression subscales was utilized.
Results: *T*-tests compared males (n = 41) versus females (n = 48), sports (n = 29) versus non-sports (n = 60), and school age (n = 23 [9-12 years old]) versus adolescents (n = 66 [13-18 years old]) on screening outcome and BYI-II variables. Results suggested that females failed significantly more than males $F = 12.476$, $p < .05$, but did not differ on BYI-II variables. Adolescents failed significantly more than school age children $F = 23.143$, $p < .05$, but did not differ on BYI-II variables. There were no differences in concussion screening outcome or BYI-II variables for type of injury.
ANOVAs examined the relations between concussion screening outcome and subscales from the BYI-II. Age, sex, and type of injury were entered separately to test their interactive effect with concussion screening outcome. Results suggested no main effect or interaction for moderators. Across all three BYI-II subscales, the main effect for screening outcome was significant. Compared to those who passed the screening, those who failed endorsed a significantly lower self-concept, and significantly more symptoms of depression and anxiety.
Conclusions: Results suggest higher failure rates for females and adolescents. Furthermore, lower self-concept and mood disturbance is related to pediatric concussion, regardless of sex, age, or type of injury. These findings extend the limited research on mood disturbance and pediatric concussion, and highlight the importance of considering emotional factors that may interfere with screening performance.
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L. SACK, N. REED, A. HUNT, D. GREENSPOON, S. SCRATCH & N. SMITH. The Effect of Active Rehabilitation on the Psychological Well-Being of Adolescents with Post-Concussion Symptoms.
Objective: To examine changes in the psychological well-being of adolescents with persistent post-concussion symptoms following participation in a six-week active rehabilitation (AR) intervention.
Participants and Methods: As part of a larger repeated measures experimental design, 33 adolescents with persistent post-concussion symptoms (67% females, $M = 15.27$ years) and their parents ($n = 32$, 94% mothers) completed measures of psychological functioning pre and post intervention (Beck Youth Inventories and Child Behavior Checklist). The AR intervention was a six-week low intensity exercise program that also included education and support. A mixed analysis of variance was conducted to examine intervention effects and sex differences.
Results: Significant decreases in adolescents' scores on the anxiety (p=.01) and anger (p=.05) subscales of the Beck Youth Inventories were found from pre to post intervention. Parent-reported levels of their adolescent's somatic complaints (p=.03) and anxiety/depression (p =.04) significantly decreased following the intervention. Males reported significantly greater levels of anger (pre: p=.04; post: p<.01) and disruptive behaviour (post: p=.03) than females.
Conclusions: While the AR intervention was not specifically designed to address psychological symptoms, positive changes in adolescents' psychological well-being were identified by both adolescents and their parents following AR. However, males reported significantly greater levels of anger and disruptive behaviour than females, indicating a need for individualized concussion interventions. This research may inform the development and delivery of comprehensive concussion management and advocates for more targeted concussion interventions to advance the fulsome recovery of all youth.
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N.S. SHERRY, A. SUFRINKO, C. HOLLAND, M. COLLINS & A. KONTOS. Neurocognitive Screening for Concussion Predicts Academic Reading Performance After Injury.
Objective: To investigate the relationship between performance on computerized neurocognitive testing (CNT) for concussion and academic reading achievement in student athletes diagnosed with a sport-related concussion (SRC).
Participants and Methods: A total of 55 athletes (27 males, 28 females) aged 14-22 years old (M=16.24, SD=1.92) diagnosed with an SRC were included in this study. Athletes were recruited from a specialty concussion clinic and evaluated between 2-23 days post-injury (M=9.22, SD=5.60, Mdn=8 days). Athletes completed the Nelson-Denny Reading Test (ND) and Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) as part of the research study. The ND test is a measure of academic reading performance and yields two scaled scores: reading comprehension and reading rate. ImPACT is a computerized neurocognitive screening tool that consists of six neurocognitive modules that yield the following composite scores: Verbal Memory, Visual Memory, Visual Motor Speed, and Reaction Time. Two separate multiple regressions (MRs) were conducted with the ImPACT composites as predictors, and ND reading comprehension and ND reading rate as outcome variables, respectively.
Results: The first MR indicated that ImPACT composites explained 18.5% of the variance in ND reading comprehension performance, $F(4,49)=2.78$, p=.04, but Visual Motor Speed was the only composite score that significantly contributed to the model, $\beta=2.13$, p=.003. The second MR indicated that ImPACT composite scores explained 17.8% of the variance in ND reading rate performance, $F(4,49)=2.66$, p=.04, but again Visual Motor Speed was the only significant predictor, $\beta=1.89$, p=.003.
Conclusions: Visual motor speed performance on CNT after SRC is related to academic reading achievement. Utilization of CNT after concussion may assist clinicians in determining academic accommodations for students after injury. Further research is needed to evaluate other potential factors related to SRC that affect academic performance.
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C.G. VAUGHAN, J. URBAN, M. KELLEY, E. DAVENPORT, C. WHITLOW, J. STITZEL, J. MALDJIAN & G.A. GIOIA. Neuropsychological Function After a Season of Youth Contact Football in Non-Concussed Athletes.
Objective: Examine neuropsychological functioning after a season of football.
Participants and Methods: 150 male football players (ages 8-18, age M=12.9 ± 2.3) without concussions and their parents completed pre- and post-season ratings of post-concussion symptoms (PCSI), executive functions (BRIEF), and depression/anxiety (RCADS). Youth completed age-appropriate computerized neuropsychological tests of attention/recognition memory and processing speed (ImPACT, MACS). Changes in ratings/performance from pre- to post-season (119 days) were compared with changes in a matched non-contact control sample (8-18, M=12.0 ±2.7, *ns;* 126 days; *ns*). Head impact exposure metrics (HIT system) across the season were examined in the football players relative to changes in ratings/cognitive performance.
Results: Outliers were removed and risk-weighted exposure (peak linear, rotational and cumulative) was transformed. The two groups did not differ on any of the outcomes ($p > .05$). Greater cumulative and rotational force exposure over the season was significantly associated with decreased pre to post-season response speed in children 8-12 (n=58; cumulative r=-.31, p = .017; rotational r=-.31, p = .018). Linear force exposure in adolescents was associated with decreased reaction time (n=52; r=.28, p=.042), but not rotational or cumulative metrics. There were no significant associations between head impact and the other 12 neuropsychological outcomes in the football group.

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Conclusions: No differences were found between football players and a non-contact control group on neuropsychological rating scales or cognitive tests. Higher force sustained was associated with decreased response speed after the season. Despite the majority of other outcomes not being associated with higher head impact, further research is needed to understand if, for some youth athletes, higher exposure may be associated with decreased processing speed after a season of contact football.

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Other

M.A. CORNWELL, M. TURMAN & H.A. BENDER. Biopsychosocial Synthesis of Neuropsychological Assessment in a Care Provider with Brain Injury Secondary to Physical Assault by a Patient: A Case Study.

Objective: The convergence of traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD) has been studied in the military, but has had little attention in civilians. Post-trauma research has focused on psychosocial or neurocognitive function; literature on the biopsychosocial synthesis of neuropsychological (NP) assessment. is scant. It is unclear how post-injury changes in cognitition may be exacerbated by psychological trauma, when return to work means repeated exposure to the event setting. This case study evaluates NP s/p subdural and subarachnoid brain hemorrhage (SDH, SAH), in the context of mood and PTSD symptoms.

Participants and Methods: The patient was referred for NP assessment s/p SDH/SAH resulting from a physical assault involving repeated strikes to the head. Post injury brain MRI revealed subacute hemorrhage in the left frontal convexity. Past medical history includes ADHD. The patient reported cognitive declines, frequent headaches, intrusive thoughts, and affective distress. The patient had NP assesment one month s/p event in the context of professional re-integration.

Results: NP assessment indicated high cognitive reserve at baseline but evinced impairments in executive functioning, information processing, attention, memory, and fine motor dexterity. Psychosocial assessment revealed clinically significant symptoms of affective distress and PTSD.

Conclusions: We examined the sequelae of SDH and SAH secondary to physical assault by a patient. Results indicated a broadly intact NP profile with specific impairments consistent with left frontal brain injury. Affective distress and PTSD symptoms are associated with cognitive dificulties; premorbid ADHD is another consideration in reatment planning and resumption of professional duties. Resiliency factors include high cognitive reserve, psychological-mindedness, help-seeking skills, and strong social support network of family, friends, and colleagues. This case illustrates the salience of integrating biopsychosocial context for comprehensive NP care.

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J.A. HAMMOND, S. HALL, M. MCCARVEL, T. MARTIN & E. CARROLL. Helmet Use, Demographic Factors, and Bicycle Riding Behaviors Among College-Aged Individuals.

Objective: Cycling represents the largest category of head injuries due to sports/recreational activities. Helmets can significantly lower the risk of brain injury for cyclists. Yet, despite efforts to promote helmet use, it does not appear that meaningful change has occurred in bicycle helmet use behaviors over the past decade. This suggests a discrepancy between helmet promotion efforts and individual bicycle helmet use behaviors. Therefore, it is important to better understand current trends in bicycle helmet use. This study examined bicycle helmet use, demographic factors, and bicycle riding behaviors in college-aged individuals, a high-risk age group.

Participants and Methods: A survey of bicycle helmet use and riding behaviors was administered to undergraduate students at two universities in the northwestern United States in 2015 and 2016 (N=547; 18 to 56 years; 10 to 19 years education).

Results: Of the total participants, 25.8% consistently wear a helmet while riding a bicycle. There was a significant association between helmet use and age, with a higher rate of helmet use reported by participants with older age ($p < .001$). In addition, higher rates of helmet use were reported by participants with history of a bike accident that required medical treatment ($p = .003$), who ride for pleasure ($p = .003$), and who ride longer distances ($p = .027$). There were no significant associations between helmet use and gender, years of education, and bike riding frequency or location.

Conclusions: A low rate of participants indicated consistent bicycle helmet use (25.8%). This research suggests that bicycle helmet use may be affected by factors such as external evaluation from peers, established bike riding habits, personal experience of a bike accident, and perceptions about risk of bike accident when only riding a short distance. Future research should further examine the impact of such factors on helmet use among this high-risk population.

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A. OSBORN, L. EVERETT, P. SHEPARD, K. AKAGI, D. AASE, C. SCHROTH, E. PROESCHNER, J. GREENSTEIN, H. PASSI, M. KRAGE, R. WALTERS & K. PHAN. The Association Between the Polytrauma Clinical Triad and Memory in OIF/OEF/OND Veterans.

Objective: OEF, OIF, and OND veterans' combat experience often involves exposure to explosive weaponry, resulting in a wide variety of blast-related injuries. Some of the most common post-injury complications include pain, mTBI, and PTSD. In fact, they manifest together frequently enough they have been dubbed the *polytrauma clinical triad* (PCT). Individually, each of the conditions have a sizable body of literature documenting their respective association to cognitive functioning. However, a majority of the literature related to the PCT focuses on mTBI and PTSD, while omitting pain. Therefore, the present study seeks to explore the relationship between cognition, specifically memory, and each of the components of PCT, including pain.

Participants and Methods: Participants were 111 veterans who completed structured interviews and a brief neuropsychological battery. Measures of the PCT include the Brief Traumatic Brain Injury Screen, the Clinician Administered PTSD Scale-IV, and the Numeric Pain Intensity Scale. Measures of memory include the Brief Visuospatial Memory Test–Revised and the California Verbal Learning Test- 2nd Edition. While controlling for premorbid functioning, a series of hierarchical multiple regression analyses were conducted, with the PCT measures entered as predictor variables and neuropsychological measures entered as outcome variables.

Results: Results showed that premorbid functioning significantly predicted visual learning and delayed recall. Results also illustrated that pain intensity significantly predicted delayed verbal recall.

Conclusions: Findings suggest that pain intensity may have a propensity to interfere with verbal based memory functions, while generally leaving visual modalities unaffected. Given that pain is a multifaceted construct, future research should explore how pain intensity, and other pain-related factors, relates to various cognitive domains within the context of the PCT.

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TBI (Moderate-Severe; Adult)

R.A. BERNIER, R. RICCITELLO, E.K. BRENNER, E. GROSSNER, J. SOTO, A.R. RABINOWITZ & F.G. HILLARY. Perceived Discrimination in Older Adults with a History of Moderate or Severe Traumatic Brain Injury: A Pilot Study.

Objective: People of color with moderate/severe traumatic brain injury (TBI) may be at increased risk for discrimination due to both disability and minority status. Discrimination may contribute to the relatively poorer outcomes from TBI that have been observed for ethnic minorities (Arango-Lasprilla et al., 2009). The present study compares perceived discrimination in White versus non-White older adults with a history of moderate/severe TBI.

Participants and Methods: Participants were 31 men and 13 women with a history of moderate/severe TBI. Thirteen participants identified as Black, two as Latinx, and 29 as White. They were, on average, 66 years old (*sd* = 8.2) and 10.5 years (*sd* = 4.5) post injury. Mean PTA [21.7(17.7)] and GCS [10.48(4.5)] were consistent with moderate/severe TBI. Participants completed the Everyday Discrimination Scale (Williams et al., 1997) as part of a larger battery.

Results: 25 of the 44 participants endorsed experiences of everyday discrimination; 67% of non-White individuals reported discrimination compared to 52% of Whites. Mean level of discrimination endorsed was significantly higher among Black and Latinx individuals [*M* = 16.7/54 (*sd* = 8.8)] compared to Whites [*M* = 12.1/54 (*sd* = 5.6); $t(42) = -2.1$, $p = 0.04$]. Whites most commonly attributed discrimination to physical disability, while the attributions of non-Whites focused on race/ancestry. Among the most frequently reported concerns for non-Whites were enduring "insults" and being perceived as "dishonest", while for Whites it was being perceived as "inferior".

Conclusions: Individuals with a history of TBI report experiences of discrimination attributed to a number of factors including disability. Racial and ethnic minorities report significantly more overall discrimination due to race/ancestry in addition to disability due to brain injury. Ongoing efforts include further data collection to characterize perceived discrimination and its relationship with long-term outcomes that may contribute to health disparities after TBI.

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B.L. BRETT, B. MAGNUS, S. BALSIS, M. MCCREA & L.D. NELSON. Examination of two TBI functional outcome measures using item response theory: Superior test information of the FSE as compared to the GOSE.

Objective: The Glasgow Outcome Scale-Extended (GOSE) is the most commonly used measure of global functioning in traumatic brain injury (TBI) clinical trials but has been criticized for its lack of sensitivity to the spectrum of TBI-related disability. The Functional Status Examination (FSE) was intended to improve the measurement of global function, yet its performance relative to the GOSE has yet to be comprehensively examined. Using an item response theory (IRT) framework, we examined the degree to which the GOSE and FSE differentiate between respondents across varying degrees of injury-related impairment.

Participants and Methods: TBI patients (N=58) and non-TBI trauma controls (N=23) presenting to a level-I trauma emergency department were enrolled prospectively within 2 weeks of injury. Outcome data (FSE and GOSE) were collected three-months post-injury. The factor structure of the scales was examined through exploratory and confirmatory factor analysis (CFA). A hybrid item response theory (IRT) model was developed to compare the GOSE and FSE in the precision with which they measure the full range of TBI-related latent impairment.

Results: Factor analyses suggested sufficient unidimensionality to apply a unidimensional IRT model (e.g., ratio of 1st to 2nd eigenvalues = 5.38). Test information curves indicated that the FSE measures a wider range of the latent continuum of functional impairment with more precision than the GOSE.

Conclusions: The FSE appears to be more sensitive measure to TBI-related impairment than the GOSE. Using the FSE to determine outcome in clinical trials may increase their efficiency and changes of success.

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K.S. CHIOU, M. JONES, H. KLECHA & E. DOBRYAKOVA. Modulatory Effects of Feedback on Metacognitive Confidence After Traumatic Brain Injury.

Objective: Theories of reinforcement learning suggest that implementing feedback may be an effective strategy to improve task performance after traumatic brain injury (TBI). It has also been found that performance can be further modulated by manipulating the properties of feedback. Adults with TBI have shown improvement in metacognitive accuracy when provided feedback; however, it remains unclear whether specific types of feedback are more beneficial in improving metacognition than others. The purpose of this study was to determine the effects of intrinsic versus extrinsic feedback manipulation on metacognition in TBI.

Participants and Methods: Adults with moderate to severe TBI completed a word-pair learning and recognition task. After initial exposure to the word-pairs, participants performed a word recognition task where feedback was provided. Participants received an equal number of trials with no feedback at all, monetary feedback, or non-monetary feedback. Finally, during a test phase, participants repeated the word recognition task, but no feedback was given. After responding to each item in the test phase, participants reported their confidence in their answer using a Likert scale.

Results: Repeated-measures ANOVA showed no significant effect of feedback type on metacognitive accuracy. However, a significant effect of feedback type on participants' reported confidence was found ($p<0.01$). Further, adults with TBI reported significantly higher confidence on trials with monetary reward compared with trials with no feedback ($p<0.01$). No significant difference in reported confidence was found between trials with no feedback and trials with non-monetary feedback.

Conclusions: The results demonstrate that confidence ratings after TBI can be increased by manipulating distinct aspects of feedback. Specifically, introducing extrinsic feedback properties (e.g. monetary worth) appears to influence reward sensitivity in TBI. Future considerations in tailoring feedback to optimize metacognition after TBI are discussed.

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J.A. FEIGER, J. SNELL & K.S. CHIOU. Differences in Neuropsychological Profiles Based on Depression Severity in Persons with Acquired Brian Injury.

Objective: Depression can impact recovery and quality of life following an acquired brain injury (ABI). While depression has been linked to neurocognitive impairments, subtleties between depression severity and neurocognitive functioning following ABI are not well understood. The primary objective of this study was to examine the association between neurocognitive performance across multiple domains and depression following ABI. A secondary objective was to describe neuropsychological profiles associated with different depression severity subtypes.

Participants and Methods: A retrospective review was conducted of 207 adults who received rehabilitation services for an ABI (118 moderate/severe traumatic brain injury, 58 stroke, 13 anoxic/hypoxic brain injury, 18 other). All individuals received a comprehensive neuropsychological evaluation and were assessed for depression using the BDI-II or the BDI- Fast Screen. Depression severity was categorized as minimal, mild, moderate, or severe based on BDI cutoff scores.

Results: Correlation analyses indicated a negative relationship between performance on tests of verbal fluency (p=.001), verbal memory (p=.014, p=.025), reasoning (p=.007, p=.002), attention (p=.027),

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and working memory (p=.005, p=.005), with depression severity. All depression severity groups were characterized by impairments (mean z-score < -1.33) in verbal fluency, processing speed, verbal and visual memory. Minimal, moderate, and severe groups were also impaired in executive functioning, while only the severely depressed group was impaired in working memory, and reasoning.
Conclusions: Findings indicate that depression levels following an ABI are associated with specific neurocognitive profiles. Furthermore, higher depression severity groups are characterized by clinically impaired functioning across more widespread domains than less severe groups. Implications for employing rehabilitation strategies given the link between neurocognitive functioning and affect in ABI are discussed.
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J. GREISMAN, K. SY, S. BANNON, E. WATSON & K. DAMS-OCONNOR. Rehabilitation Outcomes at 1 and 2 years Post-TBI Among Civilians and Military Service Members in the TBI Model System National Database.
Objective: This study aims to investigate differences between civilian and military service members in functional, cognitive, and emotional outcomes after traumatic brain injury (TBI) using data from the TBI Model Systems National Database (TBIMS NDB).
Participants and Methods: We identified 833 subjects in the TBIMS NDB who reported a history of military service and 5,572 who did not serve in the military. Subjects were matched by age, race, ethnicity, sex, and years of education. Assessments of functional independence, mood, and cognitive functioning were conducted via telephone at 1 and 2 years post-discharge from inpatient rehabilitation. Outcomes included: disability (Disability Rating Scale), functional outcome (Glasgow Outcome Scale-Extended), depression (Patient Health Questionnaire-9), anxiety (Generalize Anxiety Disorder-7), life satisfaction (Satisfaction with Life Scale), and cognitive functioning (Brief Test of Adult Cognition by Telephone).
Results: Linear regression models were run examining the influence of military status on outcomes after controlling for relevant covariates (age at injury, race, ethnicity, years of education, and sex). At 1 year post-injury, those with military histories had significantly higher life satisfaction and cognitive functioning, but also had higher anxiety and worse functional outcomes. At 2 years post-injury, only life satisfaction was significantly higher in the military history group.
Conclusions: The results of this study provide partial support for a "healthy soldier effect" that may contribute to better long-term outcomes after TBI. Further research is needed to determine whether and how TBI outcomes differ among those with and without military service history to inform tailored prevention, assessment, and treatment practices.
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E. GROSSNER, E.K. BRENNER, R.A. BERNIER, K. DELL, J. WANG & F.G. HILLARY. Brain Lesion Proximity to Hubs After TBI Influences Network Plasticity.
Objective: One longstanding question in traumatic brain injury (TBI) research is to understand the influence of diffuse and focal brain lesions on patient outcome. Network neuroscience can be used to examine how distributed systems adapt to injury. We examine the influence of lesion proximity on network hub connectivity, hypothesizing a nonlinear relationship, or increased hub connectivity with lesion proximity until the lesion encroaches on the hub.
Participants and Methods: 20 individuals with TBI underwent a 10-minute rest fMRI scan and 3D lesion volume analysis. Networks were defined using Power's 264 functional atlas. Network analyses used the graph theory metric of nodal strength, which is the sum of the strength of connections from each node. High strength hubs were defined by having nodal strength greater than 0.5 SD above the group mean.
Results: For high strength hub group(n=8), a non-linear model fit the relationship between lesion distance from precuneus and precuneus strength, p=0.012. For low strength hub group(n=12), a non-linear model was trending for lesion distance from inusla and insula strength, p=0.089. Using a linear model for high strength hub group, time post injury moderated the association between lesion distance to medial frontal (MF) hub and MF hub strength, p=0.065. Distance of lesion to MF hub correlated with Trails A time, r=-0.53, p=0.036, and Trails B time, r=0.47, p=0.056, and distance of lesion to anterior cingulate cortex predicted Trails B time, r=0.51, p=0.036.
Conclusions: Lesion location predicts network disruption, with a complex relationship between lesion distance to hub and hub strength. Findings show non-linear relationships between lesion distance and nodal strength, with time post injury moderating a linear relationship. Strength of hubs may increase when the network encounters lesions, but then connectivity is lost as the lesion encroaches on the hub. Lesion distance from hub is also a predictor of behavioral performance, demonstrating the importance of hubs in cognition.
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A.C. JOSEPH, A.M. POLITIS, P. SHAHIM & L. CHAN. Long-Term Cognitive and Functional Outcomes in Individuals with Multiple Head Injuries.
Objective: Understanding the long-term impact of multiple traumatic brain injuries (TBIs) on cognitive and functional outcomes is crucial for rehabilitative efforts. Cognitive and functional sequelae may persist into the chronic stages of TBI and may influence quality of life and impede recovery. The objective of the present study was to determine whether multiple TBIs impact outcomes at 1-year and 5-years post-injury.
Participants and Methods: Data from 72 patients (male = 47) with mild-to-severe TBI were retrospectively analyzed. Patients were evaluated at one-year post-injury, with a subset of patients (n = 26) also seen at five years. Patients were administered a battery of cognitive assessments from the TBI Common Data Elements, as well as measures of functional outcome (Satisfaction with Life Scale [SWLS], Glasgow Outcome Scale-Extended [GOS-E]). A between-groups analysis was performed for patients with 1 to 2 self-reported TBIs versus 3 or more TBIs, as well as a within-subjects analysis of each outcome measure longitudinally.
Results: One-year post-injury, patients with 3 or more TBIs (median age = 49, interquartile range = 30.5-61) performed similarly to those with 1-2 TBIs (median age = 47, interquartile range = 25-67) on cognitive assessments and functional outcomes (all ps > .1). However, at five years post-injury, patients with 1-2 TBIs showed improvements on cognitive assessments (all ps < .05) and functional outcomes (ps < .03), which was not observed for patients with 3 or more TBIs (all ps > .07).
Conclusions: These results suggest that sustaining multiple TBIs may not differentially influence cognitive or functional outcomes at one-year post-injury, but may negatively impact the trajectory of long-term recovery. As such, patients self-reporting multiple head injuries should be monitored in the chronic stages of TBI, and may require additional long-term rehabilitation.
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H. KLECHA, J. SANDRY & E. DOBRYAKOVA. Neural Correlates of Extrinsic and Intrinsic Outcome Processing in Individuals with TBI.
Objective: To investigate processing of extrinsic (i. e. monetary feedback) and intrinsic outcomes (i. e. performance feedback) in individuals with TBI during learning.

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Participants and Methods: Participants consisted of 15 individuals with moderate to severe TBI and 20 Heathy individuals. TBI participants underwent functional MRI of the head while performing a feedback-learning task. The task consisted of monetary, non-monetary, and no feedback conditions. During the feedback condition, participants were exposed to positive and negative feedback informing them whether or not they correctly learned words that were previously presented. For half of the trials of the learning task, feedback was associated with monetary gain and loss (monetary feedback condition). During the no feedback condition, participants were exposed to neutral feedback (i. e. neither positive nor negative). The learning task lasted 2 hours and consisted of a study phase and test phase that occurred outside of the MRI scanner and a feedback phase that occurred inside the MRI scanner to enable examination of brain activity associated with processing of feedback during learning. The main outcome measure where performance accuracy during learning from monetary and non-monetary feedback, and brain activity during monetary and non-monetary feedback presentation
Results: Significant group differences were detected at test phase during learning from monetary and non-monetary feedback, with healthy individuals performing better than individuals with TBI. Differential brain activation was also detected between groups.
Conclusions: Individuals with TBI are impaired in learning through immediate extrinsic and intrinsic feedback. This learning pattern is also reflected in brain activity.
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E. KORNBLITH, G. ABRAMS, L. POSECION, J. BURCIAGA, D. CHAO & T. NOVAKOVIC-AGOPIAN. Impact of PTSD Symptoms on Long-Term Cognitive Outcomes for Veterans with TBI.
Objective: Problems with attention and executive control functions are common sequelae of TBI. Mental health issues including PTSD are highly comorbid with TBI, particularly in Veterans, and also impact cognitive performance. The current study aimed to examine the impact of PTSD symptoms on multiple domains of executive function performance in a cohort of Veterans with chronic mild-severe TBI.
Participants and Methods: Data were taken from a larger study examining the impact of executive function training on cognitive, complex functional, emotional regulation, and daily functioning outcomes for Veterans with chronic mild to severe TBI (Novakovic-Agopian et al., 2018). Twenty-eight Veterans with history of mild-severe TBI (average time since injury=11 years) completed the PTSD Checklist for DSM-IV (PCL-M) and neuropsychological measures of working memory, sustained attention, mental flexibility, and inhibition.
Results: Participants' PCL-M score significantly predicted inhibition score (r square = .15, $F = 4.42$, $p<.05$; beta=-.38, $t=-2.10$, $p<.05$), accounting for 15 percent of the variance in the dependent variable. Mean PCL-M score was 48.07. Inhibition z scores ranged from -2.15 to .84; $M=-.30$. Inhibition scores did not differ based on injury severity ($F(2,25) = .38$, $p=.69$). Results for other domains of executive function were not significant.
Conclusions: In this sample of chronically injured Veterans with TBI, PTSD symptom severity is a significant driver of performance on neuropsychological measures of inhibition, but not on measures of working memory, sustained attention, or mental flexibility. This finding may have implications for assessment and treatment planning.
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N. KUCUKBOYACI, E. STONE, J. LENGENFELDER, E. VAKIL & H. GENOVA. Can We Account For Facial Affect Processing Following TBI and Save Face for Neuropsychological Batteries?
Objective: Individuals with Traumatic Brain Injury (TBI) often experience pervasive information processing problems that may include processing of emotional information. Clinicians' inability to reliably identify and address these emotional processing deficits may lead to reduced social interaction and integration of individuals in the chronic stage of their TBI recovery. As a result, emotional problems commonly reported and treated after TBI may be confounded by underlying deficits in processing of emotional information, such as facial affect recognition. The current study examined impairments in facial affect recognition and the association of these impairments with social behavior and functioning (i.e., self-report surveys) and cognitive performance (i.e., neuropsychological testing).
Participants and Methods: 27 participants with TBI, ranging from mild to severe TBI, and 24 healthy controls performed a task of Facial Emotion Matching (FEM), in addition to a neuropsychological battery that assessed cognitive performance across multiple domains (i.e., motor speed, processing speed, attention, memory, executive function). Functional behavior profile (FBP) was administered to assess social behavior and functioning issues.
Results: Correlational analyses showed that performance on FEM was correlated with social functioning, (i.e., FEM criterion – FBP_Social interaction $r = -.428$, $p = .042$). Correlational and regression analyses demonstrated that the variability in facial-affect recognition could not be fully explained by neuropsychological tests provided ($F_{change} = .729$, $p_{F\text{-}change} = .649$).
Conclusions: Findings suggest that cognitive deficits do not fully explain facial affect recognition deficits. Thus, neuropsychological assessments for patients with TBI may benefit from including facial affect recognition tests in the batteries to be able to identify and treat facial affect recognition ability that may interfere with intimate and larger group functioning.
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K. LANCASTER, A. BINDER, J. LENGENFELDER, N.D. CHIARAVALLOTI & H. GENOVA. Community Integration in Traumatic Brain Injury: the Contributing Factor of Emotion Recognition Deficits.
Objective: Individuals with traumatic brain injury (TBI) are at an increased risk of social isolation, which is damaging to wellbeing and counterproductive to successful rehabilitation. It has been proposed that social cognitive deficits that commonly result from TBI (such as reduced ability to identify emotions from faces) may contribute to reduced social integration observed in this population. However, the consequences of specific social cognitive deficits in TBI are still being delineated. The current work was conducted with the aim of characterizing the relationship between TBI participants' level of community integration and their ability to identify emotions from faces.
Participants and Methods: Twenty-seven participants with moderate to severe TBI and 30 healthy controls completed two tests of emotion recognition which employed either static photographic stimuli or dynamic video stimuli (The Awareness of Social Inference Test; TASIT). Participants also reported their level of social integration using the Community Integration Questionnaire (CIQ).
Results: Compared to healthy controls, participants with TBI were significantly impaired on both the static and dynamic measures of facial affect recognition, displaying deficits across all basic emotions (effect sizes ranged from $d=.49$ - $d=.95$). Furthermore, participants with TBI significantly were less integrated into the community than healthy controls (effect sizes ranged from $d=.50$ – $d=.77$), and we observed that emotion recognition scores were positively associated with community integration in both groups, such that participants with proficient

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emotion recognition skills were better integrated in their communities (effect sizes ranged from *r=.33 – r=.50*).
Conclusions: Emotion recognition deficits may contribute to the lack of community integration that is often observed in individuals with TBI; thus, interventions designed to improve emotion recognition may be beneficial to this population's ability to successfully reintegrate into society.
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A. LANDAU, K. SY, E. WATSON & K. DAMS-OCONNOR. Feasibility of the Brief Test of Adult Cognition by Telephone (BTACT) in Individuals in post-traumatic amnestic states after recovery from Moderate-Severe TBI.
Objective: Early cognitive functioning after traumatic brain injury (TBI) is an important predictor of post-acute outcomes, but there are inherent challenges to measuring cognition during the acute stages of recovery after moderate-severe TBI. We evaluated feasibility and usefulness of collecting a multidimensional telephone-administered cognitive test among individuals in post-traumatic amnestic state (PTA) during inpatient rehabilitation hospitalization for TBI.
Participants and Methods: Individuals with moderate-severe TBI who received inpatient rehabilitation and enrolled in the TBI Model Systems (TBIMS) national database participated in the study (n=287). Data collectors attempted to administer the BTACT within 90 days post-injury. We compared test completion rates among individuals in PTA with those who emerged from PTA, as determined by repeated clinician-administered orientation tests.
Results: Although the majority of individuals who were able to complete BTACT subtests were no longer in PTA (94-95% across 7 subtests), a substantial minority of patients in PTA were able to provide valid responses to one or more subtest (5-6%). All cases judged to be untestable due to severity of cognitive impairment were still in PTA, however, there was a subset of cases in whom testing was attempted but not completed due to severity of cognitive impairments and the majority (73-83%) were no longer in PTA.
Conclusions: Results suggest that some individuals in PTA are able to complete performance-based cognitive testing. Findings imply that excluding individuals in PTA from research studies involving acute cognitive testing can restrict sample size and limit outcome prediction modeling among patients who are slower to recover after TBI.
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W.D. LOPEZ-HERNANDEZ, M. RICO, A. BICHLMEIER, M. CORTES, D.J. HARDY, P.M. VESPA, D. PLURAD, D.A. HOVDA, E. WOO, J.M. FUSTER, D. BUDDING & M.J. WRIGHT. The Influence of Bilingualism on Traumatic Brain Injury California Verbal Learning Test Performance.
Objective: Previous work indicates individuals with a traumatic brain injury (TBI) underperform on verbal memory in comparison to controls. Language factors (e.g., bilingualism) are also know to impact test performances. We examined the individual and interactive effects of TBI and language (monolingual vs. bilingual) on California Verbal Learning Test, Second Edition (CVLT-II) performances.
Participants and Methods: The sample consisted of 28 controls and 23 TBI participants that provided voluntary consent to this IRB approved study. The CVLT-II was used to assess verbal memory. All participants passed performance validity testing.
Results: A series of 2X2 ANOVAs were conducted to determine the effect of TBI and language (monolingual English vs. bilingual English & Spanish) on CVLT-II performances. With regard to the CVLT-II, we examined total learning trials (TLT), short-delay free recall (SDFR), short-delay cued recall (SDCR), long-delay free recall (LDFR), and long-delay cued recall (LDCR). We found main effects of TBI on TLT, $F(1,47)=11.49$, $p=.001$, SDFR, $F(1,47)=10.97$, $p=.002$, SDCR, $F(1,47)=9.19$, $p=.004$, LDFR, $F(1,47)=7.18$, $p=.010$, and LDCR, $F(1,47)=7.52$, $p=.009$, with the controls outperforming the TBI participants. We also observed main effects of language for SDCR, $F(1,47)=4.48$, $p=.040$, LDFR, $F(1,47)=5.73$, $p=.021$, and LDCR, $F(1,47)=4.19$, $p=.046$, shown that bilinguals outperformed monolinguals on SDCR, LDFR, and LDCR. No significant interactions between TBI and language were found.
Conclusions: As expected, the TBI group underperformed on the CVLT-II compared to controls. Surprisingly, bilinguals outperformed monolinguals on several CVLT-II indices. We originally expected that monolingual (English) speakers would perform better than bilingual (English/Spanish) speakers due to better reinforcement/representation of the to-be-remembered English words on the CVLT-II. That said, our findings seem to suggest that bilingual speakers may have richer lexical representations that result in better verbal memory performances.
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C.M. MULLEN, A. BONO & T.A. NOVACK. Family Reported Dysexecutive Deficits Following TBI Compared to Neuropsychological Assessment Results.
Objective: This study examines the relationship between caregiver reported dysexecutive functioning following traumatic brain injury (TBI); as assessed by the Frontal System Behavior Scale (FrSBe), and performance on neuropsychological testing. It is important to define the relationship between objective cognitive testing and behavior in the community.
Participants and Methods: This retrospective study included 54 people who sustained a moderate-severe TBI referred for neuropsychological evaluation of cognitive deficits ($M = 15.65$ months since onset). Administered measures varied based on presentation and referral reasons. Neurocognitive measures presumably sensitive to frontal disorder were utilized to assess potential relationships with FrSBe responses: Trail Making Test, Verbal Fluency, California Verbal Learning Test-II, Rey Complex Figure, and the Wisconsin Card Sorting Task-64 card. Each of these measures and subcomponents were correlated with the four post-injury FrSBe domains endorsed by caregivers: Apathy, Disinhibition, Executive Dysfunction, and Total Score.
Results: Pearson correlations revealed strategy used on the Rey Complex Figure Copy (i.e., gestalt vs. piecemeal) was significantly correlated with FrSBe Apathy; $r\ (45) = .316$, $p = .034$. Inappropriate responding on Verbal Fluency (i.e., profanity) was significantly correlated with FrSBe Disinhibition $r\ (46) = .325$, $p = .027$. Importantly, none of the executive neuropsychological measures correlated with the FrSBe domains.
Conclusions: The relationship between cognitive testing and endorsed dysexecutive symptoms is tenuous; only two subcomponents exhibited significant correlation. The lack of relationships may reflect variation in presentation in the community versus a testing environment. In a structured testing environment behavioral difficulties may be suppressed that would arise in a less structured community setting. Caregiver endorsement of real world manifestations of post-TBI difficulties may provide unique information beyond neuropsychological measures.
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J. MURTHY, C. BAYER, L. HOYMAN, A. RUIZ, M. QUIRK, J. ROBBINS & S. COAD. How Normal is Normal? Examining Overall Battery Performance in Relation to Orientation Log (O-Log) Scores.

Objective: Examine whether there is variability on neuropsychological test performance within O-Log scores.

Participants and Methods: The sample included 35 inpatients (Age M=41.51, SD=18.77; Education M=13.23, SD=2.78) at a rehabilitation hospital in the post-acute recovery phase of an acquired brain injury. Patients were separated into four groups based on their O-Log scores (i.e., 20-24, 25-26, 27-28, 29-30). Scores on a neuropsychological test battery were averaged to determine overall test battery mean (OTBM), which was compared between the groups.

Results: Between-groups ANOVA revealed significant differences between O-Log groups F(3, 35)=3.71, p=.022. Post-Hoc analysis determined OTBM scores of O-Log group 20-24 (M=26.65, SD=2.42) were significantly lower than OTBM scores of O-log group 27-28 (M=37.01, SD=7.34) and O-Log group 29-30 (M=38.02, SD=6.54). There were no significant differences between OTBM scores of other O-Log groups.

Conclusions: Much of the research utilizing the O-Log as a measure of orientation uses the cut-off score of 25 as an adequate level of orientation, while a score of 30 is considered fully oriented. By comparing OTBM across ranges of scores on the O-Log, scores of 20-24 were significantly lower than higher scores on the O-Log (scores of 27-30). However, O-Log scores of 25-26 were not significantly different than higher scores within the normal range nor lower scores, suggesting that a score of 25 is a reasonable cut-off score associated with adequate orientation for testing. Nonsignificant differences of OTBM between O-Log scores ranging from 25-30 indicate full orientation is not required for neuropsychological testing. Furthermore, the steady increase in OTBM as O-Log scores increase shows that orientation could be viewed as a range that predicts neurocognitive outcome.

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J. PAREDES. Examining Cognitive Domains in Moderate to Severe Traumatic Brain Injury: A Meta-Analysis.

Objective: Determine level of cognitive functioning associated with moderate-severe traumatic brain injury (msTBI) compared to healthy controls (HC).

Participants and Methods: A total of 18 peer-reviewed articles encompassing 1,134 participants met the following inclusion criteria: a medical diagnosis of moderate to severe traumatic brain injury with no history of prior head injury, neurological disease, psychiatric illness/disorder, developmental/learning disability, substance abuse disease/history, language deficits, or other acquired brain injury. The same criteria were required for the HC with the exception of no history of head injury. Individual neuropsychological test scores were assigned to one of five domains: Memory, Working Memory, Executive Functioning, Verbal Fluency, and Attention (visual).

Results: Using Hedges' d correction for the main effect size under a fixed-effects model, the msTBI group was significantly more impaired across all cognitive domains: Executive Functioning (Hedges' *d* 0.83; 95% confidence interval [*CI*] [0.69, 0.98]); Memory (Hedges' *d* 1.07; 95% *CI* [0.91, 1.22]); Verbal Fluency (Hedges' *d* .95; 95% *CI* [0.79, 1.11]); Visual Attention (Hedges' *d* .85; 95% *CI* [0.68, 1.01]); Working Memory (Hedges' *d* .73; 95% *CI* [0.55, 0.91]). A moderator-analysis of the msTBI group revealed that time since TBI was a significant predictor in the Memory domain (p = .02; 95% *CI* [-.006, -0.0005]; R^2 = 0.35).

Conclusions: Moderate-severe traumatic brain injury results in significant impairment across five domains of cognitive functioning with medium to large effect sizes. After several years, time since injury is a significant predictor for memory, accounting for 35% of the overall variance. As time passes, effect sizes decrease, meaning memory scores improve. Time since injury was not a significant predictor for other cognitive domains.

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L. POSECION, E. KORNBLITH, G. ABRAMS, J. BURCIAGA, D. CHAO & T. NOVAKOVIC-AGOPIAN. Change in Depression and PTSD Symptoms is Associated with Improvement in Functional Performance 6 Months After Executive Function Training Among Veterans with TBI.

Objective: PTSD and depression symptoms and difficulties in executive functioning are common sequela of traumatic brain injury (TBI) among Veterans. The goal of this study was to examine the relationship between change in PTSD and depression severity and change in cognitive and functional performance 6+ months after executive function (EF) training for Veterans with chronic TBI.

Participants and Methods: Archival data were drawn from a sample of EF training for Veterans with chronic (mean 11 years post-injury) mild-severe TBI. Participants (n=17) completed Beck Depression Inventory-2 (BDI-2) and PTSD Checklist for DSM IV-Military version (PCL-M), neuropsychological evaluation, and a functional performance assessment (Goal Processing Scale; GPS) at baseline and 6+ months after completing training. Change scores were calculated by subtracting baseline score from 6m score. Multiple linear regression model was used to examine whether change in PTSD and depressive symptom severity predicts change in neurocognitive and functional performance from baseline to 6 months post EF training.

Results: Most Veterans had decreased PTSD and depression symptom severity on PCL-M and BDI-2 6+ months post EF training. Change in PTSD severity significantly predicted change of task execution on the functional assessment [R^2= .62, F (2, 7) = 5.59, p< .05], such that greater decline in PCL-M predicted greater improvement of task execution. Change in BDI-2 did not significantly contribute to the model. Change in PCL and BDI-2 scores did not contribute to change in neurocognitive performance.

Conclusions: At 6+ months post EF training, relative to baseline performance, Veterans with chronic TBI show reduction of PTSD and depressive symptom severity, and reduced PTSD symptom severity is associated with improvement on a functional performance measure. Change in neuropsychological performance in this sample may be independent from change in baseline psychiatric symptom severity.

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L. POSECION, E. KORNBLITH, G. ABRAMS, J. BURCIAGA, D. CHAO & T. NOVAKOVIC-AGOPIAN. Relationship Between Change in Symptoms of Depression and PTSD and Neuropsychological and Functional Task Performance After Executive Function Training in Veterans With TBI.

Objective: To examine the relationship between change in perceived depression and PTSD symptoms and neuropsychological and functional performance after executive function (EF) training for Veterans with chronic TBI.

Participants and Methods: Archival data were drawn from a sample of Veterans with chronic mild-severe TBI who underwent EF training (Novakovic-Agopian, et al. 2018). 17 participants completed Beck Depression Inventory-2 (BDI-2) and PTSD Checklist for DSM IV-Military (PCL-M), neuropsychological evaluation, and a functional performance assessment (Goal Processing Scale- GPS) at baseline and after completing 5 weeks of EF training. Change scores from baseline to post training were calculated for the above measures. Linear regression was used to examine change in PCL-M and BDI-2 scores and change in neurocognitive and functional performance.

Results: Change in BDI-2 scores was associated with change in neuropsychological domains of auditory working memory (R^2=0.47, F(2,13)=5.67, β= -.85, p<.05) and overall attention and executive

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function (R^2= 0.35, F (2,13)=3.52, β= -.68, p<.05) such that decrease in depression symptom severity predicted greater improvement in both auditory working memory and overall attention and executive function composite score. Change in BDI-2 scores was associated with change in the following functional assessment domains: learning & memory (R^2=0.38, F (2,13)=4.02, β= -.79, p<.05) and task execution (R^2=0.45, F(2,13)=5.24, β= -.85, p<.05), such that decrease in depression symptom severity predicted improvement in learning and task execution post EF training. Change in PCL-M scores was not associated with change in neurocognitive or functional performance.

Conclusions: Post EF training, Veterans with chronic TBI showed reduction of PTSD and depressive symptom severity. Reduction in depressive, but not PTSD, symptom severity was associated with improvement in several domains of neurocognitive and complex functional task performance.

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A.R. RABINOWITZ & T. HART. Retrospective Assessment of Pre-injury Positive Personality Traits: Reliability and Validity of Self-report in Persons with Acute Traumatic Brain Injury.

Objective: A large proportion of the variance in outcome from Traumatic Brain Injury (TBI) remains unexplained, but pre-injury factors, such as positive personality traits, are thought to play a role. The present study evaluates the reliability and validity of retrospective assessment of pre-injury positive traits (PPT) in brain-injured individuals. The traits examined include Optimism, Hope, Resilience, Sense of Coherence (SOC), Positive Affect (PA), Negative Affect (NA), and Grit.

Participants and Methods: We examine test-retest reliability of self-reported and significant-other (SO) reported PPT over a 2-week interval in a sample of 41 inpatients with acute moderate to severe TBI upon emerging from post-traumatic amnesia. Participants completed an outcome assessment by telephone 6 months post-injury. Test-retest reliability and self-other agreement were assessed by intraclass correlation (ICC). Relationships with post-injury outcome were assessed by Spearman's or Pearson's R.

Results: Patients' PPT demonstrated adequate test-retest reliability; all 7 scales had ICCs > 0.60, with 4 ICCs > 0.70. Self-other agreement was consistent with what has been reported for uninjured individuals elsewhere in the literature. Agreement for Hope, Resilience, NA, and PA were in the 0.41-0.50 range (consistent with self-other agreement for Big 5 personality traits). Optimism, SOC, and Grit were in the 0.20-0.31 range (consistent with self-other agreement trait affect). Four of the PPT (Grit, Optimism, SOC, and NA) were significant predictors of 6-month outcomes (depression, anxiety, disability, satisfaction with life, self-efficacy, and perceived stress; p < 0.05 uncorrected).

Conclusions: These findings support the reliability and validity of retrospective assessment of PPT after brain injury. Establishing valid measures of pre-injury personality factors is an important step towards understanding how positive psychology constructs may influence recovery from brain injury.

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C.L. ROPER, M. DEKARCHUK, M. HAMZA, J. PRILUCK, P. FEDIO & A.A. FEDIO. Emotion Fluency and Personal Narratives Following Moderate/Severe Traumatic Brain Injury.

Objective: The purpose of this study was to assess the effect of positive and negative emotions in fluency and brief written narratives of individuals with traumatic brain injury (TBI).

Participants and Methods: Fifteen adults (8 M, 7 F; mean age 31; 4 yrs post moderate/severe TBI with frontal lobe symptomatology) were administered standard phonemic (CFL) and semantic (Animals) fluency, followed by an experimental emotion fluency task (positive, negative, neutral words generated in 60 sec each). Patients composed a personal statement for 3 minutes and identified positive, negative, and neutral words they incorporated. Raters identified references to brain injury and post-traumatic growth (PTG). The Neurobehavioral Functioning Inventory (NFI) was administered to assess cognitive, emotional, and behavioral functioning. Results of correlations and t-tests are reported (p <.05).

Results: Patients scored in the average range on the NFI and Animals, and 1 SD below norms for CFL. CFL correlated with Negative fluency (r=.83), while Animals correlated with both Positive and Negative fluency and with self-identified Positive words in the narratives (r=.54-.61). The number of personal pronouns correlated with Positive words in narratives (r=.82). The 7 of 15 patients who wrote about their TBI were also the same patients to write about PTG. More males than females wrote about these topics and included more words related to their TBI (t[15]=1.79) and PTG (t[15]=1.86).

Conclusions: Results support previous findings that phonemic fluency correlates with Negative fluency, whereas semantic fluency relates to emotions more broadly. Personal pronoun usage in narratives relating to self-identified Positive words suggests a link between self-referencing and a positive emotional state, a finding which has been reported in individuals with right brain injury. The 100% overlap of patients (males>females) opting to discuss their brain injury and post-traumatic growth yields important rehabilitative guidance for men and women with moderate/severe TBI.

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B. SCRIBNER-WEISS & K. HAGGERTY. Psychoeducation in Severe Traumatic Brain Injury: A Feasibility Study.

Objective: Individuals with severe TBI (sTBI) often experience long-term disabilities impacting cognitive and psychological functioning. Recovery can be influenced by the neurobiology of the injury as well as social-environmental factors, requiring rehabilitation to take an interdisciplinary approach. Healthy lifestyle maintenance further promotes recovery by addressing biopsychosocial perspectives. While psychoeducational interventions for healthy lifestyle have proven effective for mild TBI, this type of intervention has never been developed for sTBI populations. The objective of this study was to assess the feasibility, acceptability, and effectiveness of a healthy lifestyle, psychoeducational group designed for individuals with sTBI.

Participants and Methods: All participants have sTBI, and were in treatment at a post-acute rehab (N=6). A10-week, hourly, group intervention was designed to promote healthy lifestyle in the context of mood and neurobiology. Feasibility was assessed by attendance and attrition. Acceptability was measured post-treatment by a Likert-scale self-report, assessing intervention satisfaction. An effectiveness questionnaire measured pre and post-treatment assessed if intervention increased understanding and interest; It was scored by 2 neuropsychologists blinded to participant identity and questionnaire timing.

Results: Retention rate was 75% (attrition n=2). Of the final sample, mean attendance rate was 86%. Average acceptability responses indicated that participants found the group to be helpful in increasing knowledge and awareness, were satisfied, and motivated to utilize healthy behaviors. 50% of participants demonstrated improvement on the effectiveness questionnaire.

Conclusions: The intervention demonstrated feasibility and acceptability. Findings demonstrate success and impetus for a refined pilot study, further tailored to individual needs. Future research should assess how increased understanding of health and wellness can influence behavior outside of a rehabilitation environment.

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D. STEPIEN, T. CHANNING & K. HAGGERTY. Relationship Between Psychological Adjustment and Utilization of Medical Resources in a Severe Brain Injury Population.

Objective: Given the lack of research devoted to the population, the objective of this study is to clarify the effect of mood outcome levels, measured by the MPAI-4, on the intensity of patient medical acuity, defined by ER visits and medical appointments in a given year, for adults suffering from severe acquired brain injuries (ABIs) in a post-acute rehabilitation facility (PAR).

Participants and Methods: Participants included adult persons suffering from severe ABI enrolled in a PAR program in New Jersey. Patients (N=61) were male (64%), middle aged (M=52.83, SD=10.61), averaged 24.98 years (SD=11.36) post injury, and enrolled in PAR for about 20% of their lives (M=11.32, SD=8.30). Annual outcome screenings included the MPAI-4 to assess injury progression and patient well-being. The predictor variable was the Adjustment Index subscale of the MPAI-4, which measured patient levels of depression, anxiety, and sensitivity to psychological factors. A medical acuity composite variable was created by combining a patient's ER visits and medical appointments in a given year.

Results: The MPAI-4 Adjustment Index significantly predicted patient's level of medical acuity (R^2=.177, F=3.113, p=.022), such that higher scores predicted increased frequency of visits to the emergency room and number of medical appointments. Analyses controlled for patient gender, age, and years since injury.

Conclusions: Overall, the current findings suggested that mood symptoms predicted the level of medical acuity within clients who suffered severe ABIs, even years post-injury. Aligned with current literature, these results found mood to be an important component of an individual's well-being, and an influential and predictive factor of their rehabilitation. The findings also highlight to the utility of periodic outcome measures in PAR facilities conducting rehabilitative care for severe brain injury populations. Future research should continue exploring predictive factors of recovery outcomes for this population.

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C. SWENSON, S. BANNON, E. LEE, K. SY, M. ESCALON & K. DAMS-O'CONNOR. Utility of Postmortem Verbal Autopsy Interview in Traumatic Brain Injury (TBI) Research.

Objective: Individuals who survive a TBI have shortened lifespan and increased risk for dementia. We investigated the feasibility, utility and accuracy of a postmortem verbal autopsy interview to characterize ante mortem functional and medical status of individuals with TBI. Verbal autopsy can inform health promoting interventions and clinical-pathological research efforts in TBI.

Participants and Methods: We developed and conducted a post-mortem verbal autopsy interview with informants of 73 deceased individuals enrolled in a TBI Model System multi-center project; all had survived ≥1 year after TBI. We abstracted past year medical records for n=14 decedents at one study site for comparison.

Results: Informant refusal rate was low and interviews lasted 40-75 minutes. Disease comorbidity among decedents was high (mean 4.6 (SD=2.6) medical conditions), and medication adherence was poor. Half had neurological or psychiatric problems in the year prior to death. Medical record comparison with verbal autopsy data showed excellent agreement for broad categories of medical conditions (e.g., circulatory conditions, heart disease, cancer) (k=0.59-0.86), and for common conditions (e.g., hypertension). Agreement for drug class was also excellent; agreement for specific drug was lower. A clear strength of verbal autopsy data was provision of information about functional impact of health conditions, and interactions with medical care.

Conclusions: Postmortem verbal autopsy interview and medical record abstraction provide complementary data to characterize cognition, health, mood, behavior, and functional status of decedents. Medical record abstraction can be labor intensive and limited by record availability; verbal autopsy interview provides contextual knowledge (e.g., services needed but not received, barriers to care) that can help identify missed opportunities for intervention/prevention, but can be imprecise. Findings support the use of this interview for research purposes.

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S. BLAKNEY, A. HENDERSON, S. SHARMA, H. KIM & H.H. WRIGHT. Improving Cognitive Function in Traumatic Brain Injury: Evidence from Two Treatments.

Objective: Individuals with traumatic brain injury (TBI) present with numerous discourse deficits including poor organization, increased tangential and conceptually incongruent content, and also decreased thematic relevance. Disruptions in cognitive processes, such as attention and working memory, may contribute to these discourse impairments. The goal of the current study was to compare the effectiveness of two treatments - Attention Process Training-II (APT-2; Sohlberg et al., 2002) and discourse processing treatment (DPT) on improving cognitive ability in participants with TBI.

Participants and Methods: Participants included four adults with mild to moderate TBI. Severity of participant's cognitive impairment was determined by performance on the Scales of Traumatic Brain Injury (SCATBI; Adamovich & Henderson, 1992). A crossover A–B–A–C–A design was used. The treatments (i.e., APT-2 and DPT) were counterbalanced across participants. Each treatment lasted four weeks and included a total of 16 sessions. The STROOP (Golden & Freshwater, 2002), Comprehensive Trail Making Test (CTMT; Reynolds, 2002), and working memory subtests of the WMS-III (Wechsler, 1997) were administered at baseline, following each treatment, and one month after treatment ended to measure attention and working memory abilities.

Results: One participant withdrew after the first treatment; three participants completed the study. No differences were found on the working memory measure from baseline, following each treatment, and at maintenance. Attention ability, measured by the STROOP and CTMT, improved for all participants after each treatment and maintained one month after treatment ended.

Conclusions: Findings suggest that both treatments improved attention abilities across participants with mild to moderate TBI but no differences were found, regardless of treatment, on the working memory measure. Improved attention functioning may result in more coherent discourse and improved communication abilities. Clinical and theoretical implications are discussed.

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TBI (Moderate-Severe; Child)

C. CERMAK, S. SCRATCH & D. BEAL. Characterization of speech, language, and cognitive communication impairments in subacute preschool traumatic brain injury: A retrospective chart review.

Objective: The primary aim of the chart review was to characterize the speech, language, and cognitive communication impairments experienced by preschool children in the subacute recovery stage (i.e. first 3 months) following traumatic brain injury (TBI).

Participants and Methods: A preliminary retrospective chart review of 35 preschool aged children with a confirmed diagnosis of moderate to severe TBI was performed. Charts of children that sustained a TBI between 15 months to 5 years 11 months and who were inpatients on the brain injury rehabilitation unit at Holland Bloorview Kids Rehabilitation Hospital between 1 January 2007 to 31 December 2016 were

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included. Data extracted from charts included demographics, pre-injury factors, injury-related factors, and speech, language, and cognitive communication data.

Results: Seventy-one percent of the population was male (n=25) and the average age at injury was 3.67 years (SD = 1.49 years). The highest incidence of TBI were from falls (n=13) followed closely by motor vehicle collisions (n=12). Thirteen of the 35 children were documented as having speech and language skills within age expectations within 3 months of injury, 6 of which were toddlers (16 months to 2:11) and 7 preschoolers (3 years to 5:11). However, 5 of the 7 preschoolers who displayed average language skills were reported to have challenges in cognitive communication.

Conclusions: This study provides a new understanding of the speech, language, and cognitive communication profiles in preschoolers in the subacute recovery stage following moderate to severe TBI. Furthermore, this study emphasizes the importance of early neuropsychological assessment as cognitive communication challenges may present as young as four and a half years of age. Lastly, this study will inform future research in early childhood TBI, particularly in studies that examine predictive factors of speech, language, and cognitive communication outcome.

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J. FISCHER, C. ALFANO, J. BICK, W. FAN, P.T. CIRINO & L. EWING-COBBS. Frontostriatal White Matter Integrity Relations With 'Cool' and 'Hot' Self-Regulation Following Pediatric Traumatic Brain Injury.

Objective: Traumatic brain injury (TBI) produces microstructural damage to white matter pathways connecting frontal and striatal regions involved in self-regulation. Frontostriatal white matter can be separated into dorsal and ventral pathways, and has been linked to cognitive ('cool') and emotional ('hot') types of self-regulation. The aims of the current study were to (1) evaluate the impact of pediatric TBI, age at injury, and sex on the integrity of ventral and dorsal frontostriatal pathways assessed 2 months after injury, and the cool and hot self-regulatory behaviors they are believed to support: and (2) investigate whether the impact of TBI on cool and hot self-regulatory behaviors after injury mediated the integrity of dorsal and ventral frontostriatal pathways, respectively.

Participants and Methods: The current study used data from a prospective, longitudinal study consisting of 84 children and adolescents with TBI and 55 typically developing (TD) children, aged 8-15. Multivariate general linear models were used to analyze group differences in self-regulation at 6 months. Multicategorical mediation analyses examined whether white matter integrity 2 months post-TBI played a role in self-regulation at 6 months.

Results: In comparison to TD children, children with more severe TBI had lower dorsal and ventral frontostriatal fractional anisotropy along with greater parent reported difficulties in cool and hot functioning. Cool self-regulation difficulties 6 months post-TBI were mediated by dorsal frontostriatal pathways at 2 months.

Conclusions: Reduced frontostriatal white matter integrity accounted for discrete performance difficulties following more severe TBI in school-aged children. Moreover, compromised dorsal frontostriatal microstructure that presents across neurodevelopmental populations may play a role in specific cool self-regulation difficulties, while broad observed behavioral problems may rely on higher order mental constructs that involve a larger network of brain structure and function.

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A. HAIGHT, A. VILLANIS, H. GENOVA, A.O. ALEXANDER & J. LENGENFELDER. Utilization and Implications of PEPS-C in Pediatric TBI.

Objective: The objective of this research was to examine how children with Traumatic Brain Injury (TBI) perform on Profiling Elements of Prosody in Speech-Communication (PEPS-C; 2015) in comparison to typically developing children (TDC), and how this difference may affect social perception.

Participants and Methods: Participants consisted of 15 children with moderate-severe TBI (age: M=12.33, SD=3.92); 73% were male. Twenty TDC were also included (age: M=11.05, SD=3.12); 45% were male. Participants completed the PEPS-C (a test of prosodic ability) and the Developmental Neuropsychological Assessment, Second Edition (NEPSY-II) Theory of Mind subscale (ToM; measures social perception). Total PEPS-C score (Receptive Results; RR) and the Boundary Understanding (BU) subscale were analyzed, as well as both the verbal and total scores on ToM.

Results: Results comparing the children with TBI and TDC indicate a significant main effect for PEPS-C BU ($F(1, 32)=5.64$, $p=.024$) and PEPS-C RR ($F(1,33)=5.66$, $p=.023$). Pediatric TBI also performed significantly lower than TDC on ToM Verbal ($F(1, 33)=5.98$, $p=.020$) and ToM Total ($F(1, 33)=6.06$, $p=.019$). Further, significant correlations were found for the children with TBI between PEPS-C RR and ToM Verbal ($r=.681$, $p=.005$) and between PEPS-C RR and ToM Total ($r=.744$, p+.001).

Conclusions: Study results suggest that children with TBI display deficits in prosodic ability and social perception as compared to TDC. Previous research has utilized PEPS-C in individuals with Autism but not in pediatric TBI. This research establishes the validity of this measure in pediatric TBI, and should be replicated with a larger sample size. Results suggest that there is a relationship between prosody abilities and social perception for children with TBI. The introduction of PEPS-C in pediatric TBI reveals a potential explanation for the difficulty these children experience with understanding mental functions such as belief, intention, deception, etc. which can ultimately lead to social relationship difficulties.

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J. LENGENFELDER, H. GENOVA, A. HAIGHT, A. VILLANIS, C. BOBER, A.O. ALEXANDER & N.D. CHIARAVALLOTI. Facial and Prosodic Emotion Recognition in Pediatric TBI.

Objective: To examine emotion recognition abilities across auditory and visual modalities in pediatric TBI using both objective and subjective measures.

Participants and Methods: Participants consisted of 15 children with TBI, (age: M =12.33, SD =3.92) and 21 typically developing children (TDC) with no neurological injury (M =11.14, SD =3.07). Participants were given the Diagnostic Analysis of Nonverbal Accuracy-2 (DANVA-2) child faces and child voices subtests. DANVA performance for both accuracy and reaction time for each of the 4 emotions; happy, sad, anger, fear, was examined.

Results: There was a significant difference between children with TBI and TDC on accuracy for sad emotions in both modalities (face, $F (1, 34) =5.98$, $p =.02$; voice $F (1, 34) =7.03$, $p =.01$). Accuracy of both happiness ($F (1, 34) =4.64$, $p =.04$) and fear ($F 1, 34) =4.11$, $p =.05$) for voices *only* also differed between the groups. With regard to reaction time, the children with TBI took significantly longer than TDC to respond to the faces showing fear ($F (1, 34) =4.30$, $p =.05$), although accuracy between the two groups did not differ.

Conclusions: Our data suggest that children with TBI may have specific difficulties correctly identifying sad emotions, both in faces and voices. Additional prosodic difficulties may also exist in correctly identifying happy and fearful voices. Relatively little work has examined the relationship between facial affect recognition and prosody following TBI,

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particularly in pediatric TBI. Additional work is needed to understand the relationship between abilities in facial affect and prosody following pediatric TBI. This relationship should be further elucidated to determine if interventions that target improving an emotion in one modality (i.e., sad face recognition) would also improve that emotion in another modality (i.e., sad voice recognition).
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J. LENGENFELDER, H. GENOVA, A. JULIANO, A. HAIGHT, A. VILLANIS, A.O. ALEXANDER & N.D. CHIARAVALLOTI. Measuring Social Communication in Pediatric TBI.
Objective: To examine social communication traits in pediatric TBI using the Social and Communication Disorders Checklist (SCDC).
Participants and Methods: 18 children with TBI, (age: M=11.44,SD=3.75) and 21 typically developing children (TDC; M=10.86, SD=3.17) completed the SCDC, a 12-item parent-rated questionnaire measuring social reciprocity and other verbal/nonverbal social traits. A higher score indicates more social communication impairments.
Results: Results indicate a significant difference between children with TBI and TDC on the SCDC total score (F (1,38)=33.60, p=.00). Children with TBI demonstrated significantly greater impairments on the subscales measuring social reciprocity (F (1, 38) =23.29, p=.00), nonverbal abilities (F (1,34)=23.65, p=.00), pragmatic language usage (F (1,38)=30.19, p=.00), and functional impairment (F (1,38) =25.10, p=.00). A cutoff score of 8 was established by the authors to indicate impairments in social commination. In our sample 50% (N=9) of children with TBI were impaired in social communication (total score>8) and 50% (N=9) were not impaired. None of our 21 TDC were impaired in social communication. Additionally, those with TBI impaired on social communication differed from those with TBI not impaired on social perception on NEPSY (Affect Recognition, F (1,17)=7.78, p=.013; Theory of Mind, F (1,17) =7.01, p=.02), parent-rated empathy (Children's Empathy Quotient, F (1,16)=15.61, p=.001) parent-rated behavioral symptoms (BASC2, F (1,17)=7.88, p=.013) and social skills (BASC2, F (1,17)=4.41, p=.05).
Conclusions: Our data suggest that children with TBI differ from TDC in parent ratings of social communication. In fact, half of our children with TBI meet the criteria for social communication impairments and differ from children with TBI without social communication difficulties on social perception, empathy, behavioral symptoms, and social skills. The SCDC may be useful in pediatric TBI to further identify children with social communication impairments.
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N.C. MAROUSIS, S.D. UCHANI, K. YEATES, H. TAYLOR, Y. CONLEY, A. WAGNER, E.L. FINK, P.M. KOCHANEK & A. TREBLE-BARNA. Can Personal Biology Account for Unexplained Heterogeneity in Neurobehavioral Outcomes Following Pediatric Traumatic Brain Injury? Feasibility and Acceptability of Research Methods.
Objective: Personal biology may account for unexplained heterogeneity in neurobehavioral recovery following pediatric TBI. We describe the methods and initial recruitment/retention rates for an ongoing study including data collection of family context, neurobehavioral outcomes, and biosamples for proteomic, genetic, and epigenetic analysis.
Participants and Methods: We recruit participants age 3-18 years hospitalized for complicated mild to severe TBI or orthopedic injury (OI). An IRB waiver allows for collection of 10cc of blood and 80mL of CSF (in children with extraventricular drains) prior to consent if the child is in the Pediatric Intensive Care Unit. When medically stable on the Trauma Unit, families: (1) consent to participate in the full study; (2) consent only to use of pre-consent biosample(s) and medical record review, or (3) refuse participation and any pre-consent biosample(s) is destroyed. In the Trauma Unit, parents complete measures of family context and child premorbid function. Children provide a saliva sample using DNA Genotek collection kits, 10cc of blood from IV or venipuncture, and complete the NIH Toolbox Cognitive Battery. Participants complete the same procedures 6 months post-injury at an outpatient hospital visit. Families are paid $50 and $100 for the research visits. Biosamples are processed for genetic, epigenetic, and proteomic analysis.
Results: Over 53 weeks, 76 participants were eligible for the TBI group and 118 for the OI group. Consent was obtained in 49% of children with TBI (92% full study) and 29% of children with OI (100% full study). At the acute visit, 94% and 62% of the TBI group and 94% and 59% of the OI group provided saliva and blood, respectively. No participants have yet been eligible to provide CSF. Retention at 6-month follow-up is 70% with 100% providing saliva and blood.
Conclusions: Recruitment/retention rates are comparable to studies without a biosample component, showing the feasibility and acceptability of studying personal biology in the pediatric TBI population.
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J.J. PATRONICK, K. YEATES, H. TAYLOR & A. TREBLE-BARNA. Assessment of Acute Neuropsychological Functioning Following Pediatric TBI Using the NIH Toolbox- Cognition Battery.
Objective: To examine how children with traumatic brain injury (TBI) perform relative to children with orthopedic injuries (OI) on a novel computerized battery of neuropsychological tests within one week post-injury in the inpatient hospital setting.
Participants and Methods: Participants included children who sustained complicated mild (n=16), moderate (n=4), and severe (n=3) TBI or OI (n=15). Children completed the NIH Toolbox-Cognition Battery (NIHTB-CB) in their hospital room on an inpatient trauma unit 2.13±1.44 days post-injury. We compared TBI and OI groups on demographic and injury characteristics and on all NIHTB-CB subtest corrected T scores, and used a repeated measures ANOVA to examine the effects of injury group, fluid vs. crystallized composites, and their interaction.
Results: Children were comparable (p>.10) across groups on demographic and injury characteristics. There were no significant differences between groups on any subtest scores; however, children with TBI performed marginally poorer than children with OI (p=.056) on the Picture Sequence Memory test, a measure of episodic memory (TBI 43.6±11.4; OI 51.1±10.5). There was no significant interaction of injury group by composite type. There was a significant main effect of composite type (p=.002), with lower fluid composite scores across injury groups (Fluid 37.7±12.6; Crystallized 47.7±8.73).
Conclusions: Because both injury groups performed significantly worse on measures of fluid cognition, factors related to hospitalization for a traumatic injury (with or without injury to the brain) may be impacting fluid cognitive skills in the acute setting. Future research should examine the effects of factors like sleep deprivation, pain medication, anesthesia, and distractions in the hospital environment on fluid cognitive skills in a larger sample of children with traumatic injuries.
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Y. SHISHIDO, R. HOWARTH & L. BLACKWELL. Contribution of Preinjury Functioning to Cognitive Recovery of Pediatric Patients with Moderate to Severe TBI during Inpatient Rehabilitation.
Objective: Cognitive recovery during inpatient rehabilitation following traumatic brain injury (TBI) is highly variable. While injury-related factors have been shown to be associated with cognitive recovery in children, evidence for the relationship between non-injury factors (e.g., preinjury functioning) and recovery is still needed. The current study

examines the potential contribution of preinjury executive, emotional, and adaptive functioning to variability in early cognitive recovery.
Participants and Methods: Participants included 112 patients (ages 3-20) with moderate to severe TBI who received inpatient rehabilitation. Preinjury functioning (BRIEF, BASC) was assessed retrospectively by caregivers upon admission. Cognitive recovery was evaluated at admission and discharge using the CALS and the WeeFIM, measures designed for serial assessment of cognitive and functional recovery during inpatient rehabilitation.
Results: No associations were found between patient's preinjury functioning and the CALS or WeeFIM total scores at discharge. Significant associations were found between preinjury functioning (executive, emotional, adaptive) and the CALS change scores for patients who showed minimal improvements across admission ("non-improvers;" change scores less than 10; t (35) = -2.06 – 2.31, p <.05). Further analyses indicated that these patients showed longer time since injury at admission (t (35) = -1.29, p < .01) and discharge (t (35) = -.70, p < .05) than those with improvements, possibly demonstrating more severe injury and/or medical complexity.
Conclusions: Results suggest potential deficits in preinjury functioning among pediatric patients with minimal improvements during inpatient rehabilitation. Findings support the importance of considering preinjury functioning for assessing recovery of pediatric patients with TBI in an inpatient setting and guiding appropriate treatments.
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J. SMITH-PAINE, M. NARAD, A. CASSEDY, H. TAYLOR, K. YEATES & S. WADE. Recovery Trajectories of IQ after Pediatric TBI: A Latent Class Growth Modeling Analysis.
Objective: To identify latent trajectories of IQ over time after pediatric traumatic brain injury (TBI) and examine the predictive value of risk factors within and across recovery trajectories.
Participants and Methods: 206 children ages 3-7 years at injury were included: 87 with TBI (23 severe, 64 moderate) and 119 with orthopedic injury (OI). We utilized data collected shortly after injury (1½ months), 12 months, and ~7 years post injury (early adolescence). Latent class growth modeling was used to identify latent subgroups. Separate models examined Verbal and Nonverbal IQ recovery trajectories following TBI versus OI. Intellectual ability was assessed using the Differential Ability Scales at baseline and 12 months and Wechsler Abbreviated Scale of Intelligence at 7 years. Variables included: age at injury, sex, race, socioeconomic status, injury severity, quality of the home environment, family functioning, and parenting style.
Results: We found different growth models for Nonverbal IQ (k=3) and Verbal IQ (k=3) within the TBI cohort. OI models also resulted in 3 latent classes for both Nonverbal and Verbal IQ. Although all models resulted in 3 latent classes (below average, average, and above average performance); trajectory shapes, contributors to class membership, and performance within each class varied by injury group and IQ domain. TBI severity was associated with class membership for Nonverbal IQ with less severe injuries associated with membership in classes with higher IQ scores; however, TBI severity did not influence Verbal IQ class membership. Parenting style had a more prominent effect on both Verbal and Nonverbal IQ within the TBI than OI trajectories.
Conclusions: Findings suggest TBI severity is related to recovery trajectories for Nonverbal but not Verbal IQ and parenting style has stronger effects on recovery in TBI than OI. Results highlight the importance of parental factors on long-term recovery after TBI and suggest parent training as an intervention to optimize cognitive development post injury.
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Media Panel: Concussion Science and the Media: The Good, the Bad, and the Ugly

Moderator: Keith Yeates

Presenters: William Barr, Karen Postal, Jason Chung, Daniel Engber

9:00–10:00 a.m.

Paper Session 18. Cardiac

Moderator: Angela L. Jefferson

9:00–10:30 a.m.

S. UYSAL, H. LIN, M. TRINH, C.H. PARK & D.L. REICH. Optimizing Cerebral Oxygenation In Cardiac Surgery: Neurocognitive Outcomes.
Objective: To test the hypothesis that optimizing cerebral oxygenation during cardiac surgery with cardiopulmonary bypass using an intraoperative near infrared spectroscopy (NIRS) monitoring-guided treatment protocol results in better neurocognitive outcomes compared to standard care in a prospective randomized controlled trial.
Participants and Methods: 96 cardiac surgery patients underwent (1) intraoperative NIRS monitoring using the Fore-Sight® cerebral oximeter, and (2) internet-based cognitive testing by the Cognitive Stability Index® (CSI) HeadMinder battery preoperatively and postoperatively at 3- and 6-months. Patients were randomly assigned to an intervention group in which episodes of cerebral oxygen desaturation (rSO_2 <60% for >60 consecutive seconds at either probe) triggered an intervention protocol, or a control group in which the cerebral oximetry data were hidden from the clinical team and no intervention protocol was applied. Response speed, processing speed, memory, and attention outcomes were defined as pre- to postoperative change scores.
Results: Simple group mean comparisons by t-tests showed that memory change scores were significantly better in the intervention group compared to the control group at both three-month (p = 0.014) and six-month (p = <0.001) time points. Based on mixed models and adjusted p-values, the mean memory change scores remained significantly lower in the control group at the six-month postoperative time point (p = 0.006, adjusted p = 0.025) only. Presence, duration and severity of cerebral desaturation, however, were not associated with cognitive change scores independent of group assignment.
Conclusions: Goal-directed therapy had a protective effect on neurocognitive outcome. Some aspect(s) of the goal-directed protocol other than desaturation *per se* contributed to the observed neuroprotective effect.
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E.E. MOORE, D. LIU, K. PECHMAN, D. GUPTA, L.A. MENDES, J.E. BOGNER, V. CHENJI, R.G. COWDEN, D.B. ELLIOT, H.A. KRESGE, S.L. LAMBROS, M.E. MOORE, J.L. THOMPSON, T.J. WANG, K. GIFFORD, T.J. HOHMAN & A.L. JEFFERSON. Lower Cardiac Output is Associated with Smaller Regional Gray Matter Volumes Among Cognitively Normal Older Adults: The Vanderbilt Memory & Aging Project.
Objective: Subclinical reductions in cardiac output are associated with regional vulnerabilities in cerebral blood flow, especially among cognitively normal older adults. Subtle changes in blood flow may increase cerebral gray matter vulnerability to injury. This study relates cardiac output to total and regional gray matter volumes among older adults.

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Participants and Methods: Vanderbilt Memory & Aging Project participants with normal cognition (n=169, 72±7 years, 58% male) underwent echocardiogram to assess cardiac output (L/min) and multimodal 3T brain MRI. Linear regressions related cardiac output to total and regional gray matter volumes quantified by multi-atlas segmentation methods from T_1-weighted images. All models adjusted for age, sex, education, race/ethnicity, Framingham Stroke Risk Profile, *Apolipoprotein E*-ε4 status, body surface area, and intracranial volume.
Results: Decreased cardiac output related to smaller total brain volume (β=7311, p=0.01) as well as smaller frontal (β=4025, p=0.01) and occipital lobe volumes (β=1109, p=0.01). In sensitivity analyses excluding participants with prevalent cardiovascular disease and atrial fibrillation, findings were similar with additional associations emerging between decreased cardiac output and smaller partial lobe (β=2559, p=0.01) and hippocampal volumes (β=94, p=0.05).
Conclusions: Among cognitively normal older adults, subtle decreases in cardiac output related to smaller global gray matter volume with regional analyses also supporting a diffuse, global pattern. Early cardiac dysfunction may have a global impact on gray matter structure due to changes in blood flow throughout the brain that contribute to oligemia or ischemia. Given these associations exist prior to the onset of any cognitive changes and vascular health is modifiable, primary prevention methods may be warranted.
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R. DO, D. LIU, D. GUPTA, L.A. MENDES, J.E. BOGNER, V. CHENJI, R.G. COWDEN, D.B. ELLIOTT, H.A. KRESGE, S.L. LAMBROS, M.E. MOORE, K. PECHMAN, J.L. THOMPSON, T.J. WANG, T.J. HOHMAN, K. GIFFORD & A.L. JEFFERSON. Lower Cardiac Output Relates to Longitudinal Cognitive Decline: The Vanderbilt Memory & Aging Project.

Objective: Subclinical reductions in cardiac output correspond to reduced cerebral blood flow, placing the brain at risk for structural injury and functional changes. This study examined the association between cardiac output and longitudinal cognitive outcomes in aging adults.
Participants and Methods: Vanderbilt Memory & Aging Project participants free of clinical dementia (n=306, 73±7, 58% male) underwent echocardiogram to assess cardiac output (L/min) and neuropsychological assessment at baseline, 18-month follow-up, and 36-month follow-up visits. Generalized least-squares regression related cardiac output to longitudinal neuropsychological performance, adjusting for age, sex, race/ethnicity, education, body surface area, Framingham Stroke Risk Profile, and *Apolipoprotein E*-ε4 status. Models were repeated, testing a *cardiac output x cognitive diagnosis* interaction and then stratified by diagnosis.
Results: Lower cardiac output related to greater decline in information processing speed (β=0.33, p=0.006) and episodic memory (β=0.02, p=0.007), including visuospatial learning (β=1.20, p=0.0004), verbal learning (β=0.27, p=0.03), and verbal delayed recall (β=0.14, p=0.001). No *cardiac output x cognitive diagnosis* interactions were observed (p-values>0.28), but stratified models suggest findings were present in participants with normal cognition (p-values<0.01).
Conclusions: Subclinical reductions in cardiac output relate to worse longitudinal cognition over a 3-year period, particularly in information processing speed and episodic memory. Findings are likely due to reductions in systemic blood flow affecting cerebral blood flow and placing the brain at risk for injury. Given results appear to be more prominent in cognitively normal older adults, interventions may be most effective prior to the onset of cognitive changes.
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H.A. KRESGE, O.A. KHAN, D. LIU, K. GIFFORD, J.G. TERRY, S. NAIR, K. PECHMAN, J.E. BOGNER, V. CHENJI, R.G. COWDEN, D.B. ELLIOTT, S.L. LAMBROS, M.E. MOORE, J.L. THOMPSON, T.J. WANG, T.J. HOHMAN, J.J. CARR & A.L. JEFFERSON. Subclinical Compromise in Cardiac Contractility Relates to Smaller Cerebral Gray Matter Volumes.

Objective: Global longitudinal strain (GLS) is a sensitive measure of cardiac contractility that is associated with cognition in older adults. This study examined if compromised cardiac contractility as assessed by GLS related to structural brain changes among aging adults without clinical dementia.
Participants and Methods: Vanderbilt Memory & Aging Project participants (n=286, 73±7 years, 57% males) with normal cognition (NC) and mild cognitive impairment (MCI) underwent cardiac magnetic resonance imaging (MRI) to assess GLS and 3T brain MRI, including T_1-weighted images to quantify cerebral gray matter volumes and calculation of an Alzheimer's disease (AD) signature imaging marker combining regions affected by AD. Linear regressions related GLS to cross-sectional gray matter volumes adjusting for age, sex, race/ethnicity, education, Framingham Stroke Risk Profile, cognitive diagnosis, intracranial volume, and *Apolipoprotein E e4* status. Models were repeated with a *GLS x cognitive diagnosis* interaction term and then stratified by diagnosis.
Results: Main effect models suggested compromised GLS related to the AD signature imaging marker (p=0.04). The *GLS x cognitive diagnosis* term related to temporal lobe and hippocampal volumes (p<0.05). Stratified results suggested compromised GLS was associated with smaller volumes in regions affected by AD pathology but only among MCI participants (p-values<0.03) with null results for NC participants (p-values>0.06).
Conclusions: This study is among the first to examine GLS as a measure of cardiac contractility in relation to structural brain health. Results suggest compromised GLS relates to gray matter atrophy in regions vulnerable to AD pathology, especially among participants with prodromal dementia. Future research is warranted to understand how subclinical changes in cardiac contractility affect longitudinal cognitive and neuroimaging outcomes.
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C. BOWN, D. LIU, D. GUPTA, L.A. MENDES, J.E. BOGNER, V. CHENJI, R.G. COWDEN, D.B. ELLIOTT, S.L. LAMBROS, M.E. MOORE, J.L. THOMPSON, T.J. WANG, T.J. HOHMAN, K. GIFFORD & A.L. JEFFERSON. APOE Genotype Modifies the Cross-Sectional Association Between Cardiac Output and Cognition.

Objective: Subtle reductions in cardiac output relate to lower regional cerebral blood flow, especially in regions where Alzheimer's disease (AD) pathology first evolves. Apolipoprotein E (*APOE*) ε4 is a genetic susceptibility risk factor for AD that moderates vascular damage. This study investigated whether *APOE* genotype modifies the cross-sectional association between cardiac output and cognition.
Participants and Methods: Vanderbilt Memory & Aging Project participants free of clinical stroke and dementia (n=306, 73±7 years, 42% female) underwent echocardiograms to determine cardiac output (L/min), venous blood draw to determine *APOE* genotype, and comprehensive neuropsychological assessment. Linear regressions related cardiac output to neuropsychological test performance, adjusting for age, sex, education, race/ethnicity, body surface area, Framingham Stroke Risk Profile, and *APOE*-ε4. Models were repeated testing a *cardiac output x APOE* interaction with identical covariates and then stratified by ε4 carrier status, excluding *APOE*-ε4 as a covariate.

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Results: Main effect models were null (p-values>0.15). The *cardiac output x APOE* interaction term related to naming (β=0.84, p=0.004), category fluency (β=1.05, p=0.03), information processing speed (β=-5.04, p=0.005), executive functioning (β=0.19, p=0.02), and visuospatial skill performances (β=0.80, p=0.007). Stratified models suggest lower cardiac output was associated with poorer neuropsychological performances among *APOE*-ε4 carriers.
Conclusions: *APOE* genotype appears to modify the association between cardiac output and neuropsychological performance such that lower cardiac output relates to poorer performances among *APOE*-ε4 carriers. These findings add to increasing evidence that *APOE*-ε4 carrier status strengthens associations between vascular disease and worse brain health outcomes.
Funding : IIRG-08-88733, R01-AG034962, K24-AG046373
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Paper Session 19. Memory & Executive Functioning

Moderator: Steve Guy

9:00–10:30 a.m.

J. STIVER, E.E. MORAN, C.L. CROOK, J. WEATHERS, A. PHILI, R. ZIMMERMAN, D. TOTO & M. ZIMMERMAN. Variable Sleep Quality Predicts Poorer Spatial Learning and Memory.
Objective: While research on sleep and cognition has largely focused on mean values of sleep measured across multiple nights, few studies have examined the potentially negative effects of night-to-night variability in sleep quality on brain function. The purpose of this study was to determine the relationship between variability in sleep quality and spatial learning and memory in young adults. We hypothesized that greater intraindividual sleep efficiency variability (SEv) would predict poorer spatial learning and recall performance.
Participants and Methods: University students from the Bronx, NY (*N*=188; mean age=20.4) wore an at-home actigraphic device (Actiwatch Spectrum PRO; Philips Respironics Inc.) on the non-dominant wrist for an average of 10.5 days (range 6.8–21.0) to measure objective sleep behavior. Participants then returned to the laboratory and were administered neuropsychological tests. SEv was calculated as the intraindividual coefficient of variation (*SD/M* x 100) of the percentage of time spent asleep in the sleep interval. Spatial learning and memory were assessed using the maze efficiency index scores (correct moves per second) of the Cogstate Groton Maze Learning Tests (GMLT learning average, GMLT learning slope, GMLT recall).
Results: Linear regression showed that SEv predicted lower performance on tests of spatial learning (GMLT learning average; β=-.23, $p<.01$ and GMLT learning slope; β=-.18, $p<.05$) and recall (GMLT recall; β=-.17, $p<.05$). Even after controlling for average total sleep time, SEv remained a predictor of poorer learning and memory across all GMLT measures ($ps<.05$).
Conclusions: Intraindividual variability in sleep quality predicts worse spatial learning and memory in young adults. Significant effects of SEv were over and above that of average total sleep time, suggesting unique contributions of variable sleep quality beyond mean sleep quality. Results highlight the importance of maintaining consistent sleep patterns for optimal cognitive functioning.
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R.M. BILDER, A.M. LENARTOWICZ, J.M. RISSMAN, S.M. LOO, J.M. POCHON, K.M. ENRIQUEZ, H.M. TRUONG & C. BEARDEN. Working Memory Across Levels of Analysis.
Objective: The Research Domains Criteria (RDoC) initiative identified a series of constructs including "working memory," which is putatively specified by features at different levels or "units of analysis"; we used MRI, EEG, neurocognitive, symptom, and disability assessments.
Participants and Methods: We examined (1) Care-Seeking (CS, n=106) and (2) Non-Care-Seeking (NCS, n=44) individuals from the community. All participants had the same battery of clinical, cognitive, EEG and MRI assessments. We used a combination of dimension reduction strategies and general linear models to examine both the structure of measures within levels of analysis and relations across levels of analysis.
Results: The CS group had more mental disorders including Major Depressive Disorder (50% CS vs 21% NCS), Anxiety Disorders (25% CS vs 14% NCS), and psychotic disorders (7.5% CS vs 0% NCS). Symptom measures explained most of the variance in disability (75%) but neurocognitive measures shared less than 10% of variance with disability and were redunant with clinical ratings. sMRI measures accounted for 13% of the variance in disability, and total gray matter volume alone explained 7% of variation in disability across groups. Associations among neurocognitive, EEG and MRI variables were moderate, with typical multivariable associations sharing 10% of variance between sets of variables within each level.
Conclusions: The results suggest that "multi-level" models of RDoC dimensions face several challenges, including limits in the strength of associations across levels. While we observed relatively robust associations of basic indicators like total gray matter volume reduction with the severity of disability, this effect was not obviously mediated via EEG, fMRI or cognitive measures. There do exist patterns of association among neurocognitive, EEG and fMRI measures that may define meaningful functional neuroanatomic dimensions, but so far their relations to higher level symptoms, syndromes, and disability remain less clear.
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K. GICAS, A. PETERSSON, E. LIVINGSTON, A. JONES, K. WACLAWIK, P. JONES, O. LEONOVA, W. PANENKA, D. LANG, A. BARR, A. THORNTON & W. HONER. Risk Factors for Longitudinal Change in Memory Functioning Among Homeless and Marginally Housed Persons.
Objective: Memory impairment is prominent among persons who are homeless or marginally housed. The extreme multimorbidity in this population may contribute to cognitive decline over time, but this has never been examined. This study aimed to identify key clinical risk factors for longitudinal change in memory functioning among socially marginalized people.
Participants and Methods: Three hundred and four (N=304) participants had available data from an ongoing 10-year study of adults (mean age = 43.9 years; 78% male) living in marginal housing or homelessness in Vancouver, Canada. Participants underwent complete cognitive, psychiatric, and neurological assessments at baseline and annually (mean number of follow-ups = 5.15). Linear mixed effects models were used to examine changes in memory functioning over time using immediate and delayed recall scores from the Hopkins Verbal Learning Test Revised. Cross-level interactions were examined to determine whether change in memory functioning was associated with substance use, history of traumatic brain injury, psychosis, and viral infection.
Results: In models adjusted for age, education, and sex, immediate recall scores significantly increased over time (B = .190, SE = .046, p <.001), but delayed recall scores did not (B = -.016, SE = .010, p = .111). Time was entered as a quadratic term for improved model fit (delayed memory only). In separate adjusted models for risk factors, alcohol dependence (B = -.019, SE = .008, p = .021) and history of

traumatic brain injury (B = -.016, SE = .007, p = .017) were associated with accelerated trajectories of decline for delayed recall scores.
Conclusions: In homeless and marginally housed adults, alcohol dependence and history of traumatic brain injury appear to be important clinical risk factors for long-term decline in memory functioning. These may reflect key targets for early interventions that could mitigate risk for future dementia and improve long-term functional outcomes.
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B.D. HO, T. STEIN, T. ANG, R. PIERS & R. AU. Neurofibrillary Tangle Burden in the Dorsolateral Frontal Cortex is Associated with Processing Speed Impairment: A Digital Neuropathological Analysis from the Framingham Heart Study.
Objective: Neurofibrillary tangle (NFT) accumulation in the brain has been associated with cognitive decline. However, no study has utilized digital pathological methods to evaluate NFTs in the dorsolateral frontal cortex (DFC) in relation to processing speed (PS) and executive function (EF). Digital pathology allows continuous measures of brain pathology for more precise statistical analyses.
Participants and Methods: Framingham Heart Study participants performed Trails A (n=111) & B (n=95) as part of a neuropsychological (NP) evaluation. At death, these brain donors underwent neuropathological examination. Participants' DFC were immuno-stained for various biomarkers; exact counts of each were measured using Leica's ImageScope. The association between DFC NFT and Trails A & B performance was evaluated using multi-linear regression, adjusted for age, sex, education, interval between death and most recent NP exam, NeuN count, Aβ4G8 count, neocortical lewy body, and frontotemporal lobar degeneration. Trails A & B were log-transformed to adjust for skewness. Participants with missing data were excluded.
Results: Ninety-six participants met criteria for the first study (mean age=83.20, 50% female, 40.63% college graduate, mean interval between death and most recent NP exam=2.76 years, mean NeuN/mm^2=214.64, mean Aβ4G8/mm^2=543.72). The regression was significant (F(11, 84)=4.132, p<0.000), with an adjusted R^2 of 0.266. Time to completion on Trails A increased by 3.05% for every NFT/mm^2 in the DFC (p=0.001). Subsequent analysis for Trails B (n=83) was significant (F(11, 71)=3.680, p<0.000), with an adjusted R^2 of 0.264; however, only age significantly contributed.
Conclusions: Impairments in PS but not EF may depend mainly on DFC NFTs. NP metrics captured during life could potentially act as surrogates for NFT burden in particular brain regions. Future research should explore associations between performance on other cognitive tests and precise measures of NFT in related brain structures.
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K. GETTENS. The Role of Executive Function in Weight Management: Predicting Weight Loss Maintenance Outcomes in a Behavioral Weight Loss Intervention.
Objective: Weight loss maintenance (WLM) is an elusive goal. Executive functions (EF) are implicated in the initiation of health behavior, including weight loss, and may be crucial to understanding maintenance success. Few studies have prospectively explored the relationship between EF, weight loss, and WLM. The present study examined associations between EF, weight loss and WLM in a 6-month couples-based behavioral weight loss intervention.
Participants and Methods: Participants were cohabitating spouses enrolled in a couples-based weight loss program with weekly group sessions (N_{dyads}=64, M_{age}=54.0 ±9.5, M_{BMI}=34.2 ± 5.4kg/m^2, 50% female, 89% Caucasian). Weight (kgs) was measured at baseline, end of treatment (6 months), and 12-month follow-up. Maintenance was defined as percent change from 6-12 months. EF was measured at baseline. The D-KEFS Color-Word Interference and Trails A&B tests were used to assess inhibitory control, processing speed, and shifting. Self-report EF was measured using the BRIEF-A. Subscales measure nine domains of EF; higher scores indicate greater difficulty. IQ was measured using the WASI-II 2-subscale estimate.
Results: Multilevel regression analyses were used to account for interdependence within dyads, controlling for baseline weight, intervention group, age, and IQ. Analyses revealed that Trails B, a measure of cognitive flexibility and shifting, significantly predicted percent weight loss at 6 months (B = .05, [.01, .11], p=.01) and maintenance (B=.03, [.003, .07], p=.03). BRIEF-A Initiation (B= 14, [.01, .26], p=.04) and Inhibition (B= .14, [.01, .26], p=.04) subscales significantly predicted maintenance success.
Conclusions: Results indicate that cognitive shifting predicts weight loss at 6 months, while shifting, self-reported initiation, and inhibition skills predict maintenance success in a behavioral weight loss intervention. Findings elucidate the role of high-order cognitive processes in weight-related health behavior change, and contribute novel insight into factors that may impact WLM.
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A. BECK, D.E. GUSTAVSON, M.S. PANIZZON, J. ELMAN, M. SANDERSON-CIMINO, C. FRANZ, M.J. LYONS & W.S. KREMEN. Longitudinal Associations Between Subjective Memory, Objective Memory, and Hippocampal Volume: A Twin Study.
Objective: Subjective memory (SM) concern has been associated with objective memory (OM) and hippocampal volume. However, many studies examine older adults using cross-sectional designs. The goal of this study was to examine the longitudinal associations between SM, OM, and hippocampal volume, as well as the heritability of SM, in a sample of middle-aged adults.
Participants and Methods: SM was assessed in 1484 male twins (736 pairs; 425 monozygotic, 311 dizygotic, 12 unpaired) at 3 timepoints: mean age 38, and waves 1 (mean age 56, range 51-60) and 2 (mean age 62, range 56-66) of the Vietnam Era Twin Study of Aging. These are referred to as: age 38, 56, and 62. OM (assessed with 3 episodic memory tasks), hippocampal volume, and depression were assessed at age 56 and 62. Twin analyses were Cholesky decompositions.
Results: At age 38, 19% of variance in SM was attributable to genetic influences, and 76% to unique environment influences. At age 56 and 62, genetic influences respectively accounted for 31% and 26% of variance in SM; unique environmental influences respectively accounted for 69% and 74%. Age 38 fully captured genetic influences at age 56 and 62 (genetic rs=1.00), but environmental influences were entirely different at both ages 56 and 62 (environmental rs=.014 & .004). Phenotypically—controlling for depression—SM at age 56 was associated with OM at age 56 (b=-.174, p=.002) and age 62 (b=-.187, p = .001), and hippocampal volume at age 62 (b=-.129, p=.030). SM at age 62 was associated with OM at age 62 (b=-.082, p=.049) and hippocampal volume at age 56 (b=-.125, p=.020). Age 38 SM was correlated with age 56 and 62 SM, but not later OM or hippocampal volume.
Conclusions: We examined SM concern beginning at a very young age (38 years). Different environmental factors influence SM as age increases, but there are stable genetic influences on SM across 24 years. Effects are small, but SM concern is predictive of objective memory function and hippocampal volume between ages 56 and 62, independent of effects of depression.
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Paper Session 20. Depression & Anxiety

Moderator: Shawn McClintock

9:00–10:30 a.m.

R.C. YEUNG & M.A. FERNANDES. Altered Working Memory Capacity for Social Threat Words in High versus Low Social Anxiety.

Objective: Differences in working memory capacity have been suggested in individuals with high levels of social anxiety. Specifically, they may preferentially maintain socially threatening material in working memory. Here we used a series of word span tasks, adapted from the digit span task, to assess working memory capacity for material of varying threat-relatedness, in individuals either high or low in social anxiety.

Participants and Methods: In Experiment 1, 80 undergraduates were recruited (40 low social anxiety, 40 high social anxiety). Participants performed span tasks with words that were either neutral (e.g., "errand"), generally threatening (e.g., "abuse"), or socially threatening (e.g., "party"). In Experiment 2, another 80 undergraduates were recruited (40 low social anxiety, 40 high social anxiety). Participants performed the same span tasks with the addition of a fourth word list that was both neutral and matched to the socially threatening word list in terms of semantic similarity.

Results: Experiment 1 revealed reduced working memory capacity for socially threatening words in those with high compared to low social anxiety. Importantly, this relative reduction in working memory capacity was driven by the low social anxiety group showing expanded capacity for socially threatening words relative to neutral or generally threatening words. Furthermore, reductions in working memory capacity for social threat were uniquely predicted by social anxiety, and not by other theoretically similar constructs such as state general anxiety, trait general anxiety, or depression. Experiment 2 showed that the semantic similarity of the words was not responsible for the differences in working memory capacity between list type or social anxiety group.

Conclusions: Our findings suggest that individuals high in social anxiety may fail to upregulate working memory capacity for social information due to the activation of, or rumination upon, socially threatening concepts.

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R. VENEZIA, M. GORLYN, A. BURKE, M. OQUENDO, J. MANN & J. KEILP. The Impact of Cognitive Reserve on Neurocognitive Performance in Major Depressive Disorder.

Objective: Cognitive reserve may decrease the degree of neurocognitive deficit observed in MDD. We sought to determine if proxies for cognitive reserve such as estimated intelligence and education level moderated the extent of MDD-related neurocognitive deficits.

Participants and Methods: Unmedicated, currently depressed patients with MDD (n=269) and healthy volunteers (n=143) were compared on measures assessing psychomotor speed, interference processing, verbal memory, visual memory, and executive functioning. Moderating effects of estimated intelligence and education level were examined as interactions with patient status in a regression model.

Results: Simple patient vs. non-patient differences were found for most measures. However, the interaction of estimated intelligence and patient status was significant for processing speed, verbal memory, visual memory, and executive functioning, with patient/non-patient differences diminishing with higher estimated intelligence. Interference processing differences were only affected by increasing age. Education only affected differences in executive functioning.

Conclusions: Higher estimated intelligence reduced the magnitude of most MDD-related neurocognitive deficits. This may confound attempts to characterize these deficits in higher functioning samples. More challenging tasks may be needed, given the predictive value of neurocognition for differential therapeutic and clinical outcomes.

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N. BARBEE, J. VONK & J.J. MANLY. Ethnic Density: Relationship Between Segregation in Primary Schooling and Late Life Depression in African Americans.

Objective: The ethnic density hypothesis states that despite stressful life experiences, being a minority surrounded by other minorities provides resilience mediated by social support. This study examined whether ethnic density in childhood schooling provided protection against having depressive symptoms as an older adult.

Participants and Methods: Participants were 1552 US-born non-Hispanic Blacks and non-Hispanic Whites in a community-based, longitudinal study of aging and dementia. An ethnically dense versus dissimilar peer-student population was determined by self-reported elementary school racial/ethnic breakdown as segregated (>90% same-race) or integrated (<90% same race). We used logistic regression models to predict depressive symptoms, defined as reporting at least two symptoms of Major Depressive Disorder in the past month.

Results: Among the 940 Blacks (age m = 75.8+6.5; 73% female), 113 (12%) went to integrated schools, while almost all of the 612 Whites (age m = 74.1+5.8; 57% female) went to predominantly White schools (98.5%). Among Blacks, those who went to segregated Black schools were 45% less likely (OR 95% CI = .32 – .97) to endorse depressive symptoms than those who went to predominantly White schools, covarying for age, sex/gender, number of follow-ups, parental occupation, and birth region (South vs. North US). While in general, Whites were more likely to report depressive symptoms (19.0%) than Blacks (14.9%; p = .035), depressive symptoms did not differ between Whites and Blacks who went to predominantly White schools in either adjusted (OR = 1.33, CI = .79 – 2.25) or unadjusted models.

Conclusions: Using depressive symptoms as an outcome, we found support for the ethnic density hypothesis. For Blacks, attending a segregated Black school was associated with fewer depressive symptoms in late life, but attending a White school was not protective for either Whites or Blacks. Future analyses should explore whether ethnic density is protective against cognitive decline and other mental health disorders.

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K. MANNING, D. MCQUOID, D.C. STEFFENS & G.G. POTTER. Regression Based Change Approach to Understanding Cognitive Decline in Late-Life Depression.

Objective: Weakness in processing speed-executive functioning (PSI-EF) is common in older adults with late-life depression (LLD). Moreover, LLD increases the likelihood of developing dementia, particularly vascular dementia, in 5-10 years. Questions remain regarding the extent of annual cognitive change in LLD and if this change is different from that experienced by cognitively normal non-depressed elders (CN). Considering LLD may be an antecedent to vascular dementia, we hypothesized older adults with LLD would experience greater annual change on tests of PSI-EF when compared to CN.

Participants and Methods: Participants included 137 LLD (major depression) and 121 CN adults age 60+. Dementia at baseline and major neurological / psychiatric disorders were excluded. Participants completed a full cognitive battery at baseline and 12 and 24 months. We used regression formulas derived from the CN group to determine reliable cognitive change indices over time. Meaningful or reliable change was defined when an individual's observed difference score (e.g., Year 1 – 0) exceeded the expected difference score estimated from baseline test performance and demographics (e.g., age, gender, education, race).

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Chi-square analyses determined whether groups differed in cognitive reliable change. Sensitivity analyses attempted to disentangle factors contributing to change (e.g., depression onset).
Results: Compared with CN, LLD were more likely to experience two year reliable change in PSI-EF (e.g., 24% of LLD patients declined over two years on Trail Making B compared to 3% of CN, $X^2_{(1)} = 13.04$, $p < .001$). LLD patients were also more likely than CN to experience reliable change in memory (e.g., 14% of LLD patients declined over one year on Logical Memory II compared to 5% of CN, $X^2_{(1)} = 6.58$, $p < .05$). Depression onset moderated decline; patients with late-onset (> age 50) were more likely to decline on several tests compared to young-onset.
Conclusions: LLD is associated with clinically meaningful decline in PSI-EF and memory over two years.
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R. MELROSE, J. SU, H. GORDON, C. MORIOKA, D. SULTZER & S. EL-SADEN. Neuroradiological Biomarkers of Dementia in Post-Traumatic Stress Disorder.
Objective: Post-traumatic stress disorder (PTSD) doubles dementia risk. Mechanisms for this include neuropathological accumulation in the setting of chronic stress or increased cerebrovascular disease. We aimed to identify neural biomarkers associated with dementia in PTSD.
Participants and Methods: We conducted a chart review of 200 Veterans age 60+ that completed a clinical MRI brain scan. Patients were drawn from available records such that there were four equal groups stratified by PTSD (P) and dementia (D) diagnosis. Those with evidence of neurological disorder (e.g. cyst), cortical stroke, or traumatic brain injury were excluded from analysis (n=36). Biomarkers were neuroradiological ratings of white matter hyperintensities (WMH: deep and periventricular) and atrophy (medial temporal lobe, cortical and central). Analyses were limited to those that served during a war period: P+D-, n=39; P+D+, n=41; P-D-, n=37; P-D+, n=28. Biomarkers were explored using MANOVA, with WMH and atrophy as dependent variables, and PTSD and dementia as predictors.
Results: PTSD were younger; age was included as a covariate. There were near equal numbers of Caucasian and racial/ethnic minorities in each group and the sample was largely male. There was an overall effect of older age ($F(2,139=21.3$, $p<.001$) and dementia diagnosis ($F(2,139=16.0$, $p<.001$) on higher biomarkers. There was an interaction between PTSD and dementia regarding WMH ($F(1,140)=15.2$, $p<.05$), driven by higher WMH in P-D+ relative to all other groups. There was no interaction regarding atrophy.
Conclusions: Preliminary findings suggest that in those with PTSD, comorbid dementia is associated with higher rates of brain atrophy, but no differences in WM disease; in contrast patients with dementia and no PTSD have elevated WM disease and atrophy relative to their non-demented counterparts. Significant small vessel disease does not appear to be the primary predictor of dementia in PTSD, and instead processes directly related to cortical atrophy may be more prominent.
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S. GUJRAL, K.I. ERICKSON, A. GILDENGERS, S.F. SMAGULA, S. ANDERSON, C.F. REYNOLDS & M.A. BUTTERS. The Protective Effects of Physical Activity on Cognitive Decline and Depression in Older Adults with Mild Cognitive Impairment and Comorbid Depressive Symptoms.
Objective: The primary aim of this study was to examine whether physical activity (PA) and activity rhythms (AR) were associated with protection against cognitive decline and depressive symptoms in older adults with Mild Cognitive Impairment (MCI) and depressive symptoms.
Participants and Methods: Participants included 44 adults aged 60+ years with a new diagnosis of MCI per NIA-AA criteria and subclinical depressive symptoms. Participants engaged in a pilot intervention testing the effects of Problem-Solving Therapy (PST) alone and PST plus exercise for preventing Major Depression and slowing cognitive decline over 15-months. The exercise intervention had poor fidelity due to suboptimal adherence; however, PA and AR levels were monitored using Sensewear accelerometers pre- and post-intervention and at a 12-month follow-up. Depressive symptoms were assessed with the Patient Health Questionnaire (PHQ-9) and cognitive functioning was assessed using the Repeatable Battery of Neuropsychological Status and the Delis-Kaplan Executive Functioning System. Cross-sectional and longitudinal associations between PA and AR markers with depression and cognitive outcomes were tested using regression models and independent samples t-tests.
Results: Across groups, greater pre-intervention PA levels predicted greater improvement in memory performance (t= -2.022, p=0.04) and greater AR stability predicted greater reduction in depressive symptoms (Beta = 0.52, p= 0.004) over the intervention course. Further, treatment responders (i.e., 2+ point decline in PHQ-9) maintained PA levels and AR stability ($p>0.05$) for 12-months following the intervention, whereas non-responders showed a decline in PA and AR markers.
Conclusions: In a sedentary population at increased risk for Major Depression and dementia, greater pre-intervention PA engagement predicted slowing of cognitive decline and greater AR stability predicted greater reduction in depressive symptoms.
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Symposium 14. Computerized Tools for Cognitive Assessment

Chair: Darlene P. Floden

Discussant: Russell Bauer

Presenters: David Sabsevitz, Richard Gershon, Stephen Rao, Robyn M. Busch, Katherine L. Possin

9:00–10:30 a.m.

D.P. FLODEN, D.S. SABSEVITZ, R. GERSHON, S. RAO, R.M. BUSCH & K.L. POSSIN. Computerized Tools for Cognitive Assessment.
The potential utility of computerized cognitive assessment tools is widely recognized. This symposium will feature talks on computerized cognitive assessment tools that are currently under development for clinical use. Dr. David Sabsevitz will present an iPad based assessment tool, NeuroMapper, developed for use in extra- and intra-operative mapping in patients undergoing neurosurgery for epilepsy or brain tumor. Dr. Richard Gershon will present data on the MyCog paradigm developed to detect cognitive impairment or dementia in primary care settings. Dr. Stephen Rao will present data on an iPad based instrument, the Cleveland Clinic Cognitive Battery (C3B), developed for early detection of preclinical and prodromal Alzheimer's disease in a primary care setting. Dr. Robyn Busch will present data on the Brief Assessment of Cognitive Health, an iPad based cognitive screening measure that was designed to identify adult patients likely to benefit from more detailed cognitive testing. Dr. Katherine Possin will present data on a tablet-based tool, the Brain Health Assessment, designed to screen for mild cognitive impairment in primary care settings. The goal of these talks is to increase awareness of tools that may be of use to neuropsychologists in the coming years and to stimulate discussion, led by Dr. Russell Bauer, on the appropriate development and use of computerized testing measures.

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D.S. SABSEVITZ. NeuroMapper Testing Platform: Using Technology for Surgical Mapping.

Objective: Direct cortical stimulation (DCS) is routinely used to map sensorimotor and language functions during extraoperative monitoring of epilepsy patients and during awake brain tumor resections. Common methods for mapping language include having patients count or recite prose, or name pictures on flashcards during DCS and there is a paucity of paradigms to map non-language eloquent functions despite increasing interest in mapping broader neurocognitive functions. There is a clear need to refine and innovate methods for mapping cognition as our current methods tend to lack conceptual sophistication with respect to tasks used, testing cognition using traditional neuropsychological methods (e.g., showing stimuli cards, question and answer) can be cumbersome and inefficient for use in the intraoperative environment (e.g., difficult to rapidly switch between paradigms to allow for multidimensional mapping), and there is limited ability to monitor potentially more sensitive behavioral metrics (e.g., response latencies) in real time. This presentation will discuss the use of a novel, tablet based assessment tool for mapping cognition during DCS.

Participants and Methods: Epilepsy and brain tumor patients undergoing extra-operative and intra-operative mapping for surgical planning using a novel tablet based testing system will be included in this presentation.

Results: Specific case examples will be used to illustrate the utility of using NeuroMapper, a tablet based assessment tool, in the operating room with specific focus on how technology can improve on current methods of cognitive mapping.

Conclusions: There is a clear need to innovate current methods of neuropsychological assessment. Using computer based assessment methods for surgical mapping in the operating room offers numerous benefits over traditional methods of assessment and should be considered for use.

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R. GERSHON, M. WOLF, D. CONDON, V. USTSINOVICH, J.N. BENAVENTE, R. O'CONOR, M. ARVANITIS & L. CURTIS. A Practical Approach to the Detection of Cognitive Impairment and Dementia in Diverse Primary Care Settings: The MyCog Paradigm.

Objective: We adapted targeted assessments from the NIH Toolbox for the Assessment of Neurological Behavior and Function (NIHTB) and imparted a clinical paradigm for the routine assessment and detection of cognitive impairment or dementia (CID) in diverse primary care settings.

Participants and Methods: An ongoing NIA-sponsored cohort study ('LitCog'; R01AG030611; PI: Wolf) was leveraged to recruit a well-characterized sample of 80 older adults (n=25 with CID; n=55 'cognitively normal') receiving primary care from either one academic general internal medicine practice or five federally qualified health centers. Participants received two NIHTB assessments, including Dimensional Change Card Sort (DCCS) measuring cognitive flexibility, and Picture Sequence Memory (PSM) assessing episodic memory. Clinician feedback on the feasibility of the MyCog paradigm was also obtained from 25 physicians, administrators, and primary care researchers from these different community practices.

Results: For practical considerations, a two-step process was employed; patients were asked to report a subjective cognitive concern. If a concern was reported (n=52), the PSM and DCCS was then applied. Among patients with a cognitive complaint, both PSM and DCCS demonstrated higher than estimated diagnostic utility (area under the curve (AUC) 0.78, 0,79 respectively) each on their own for detecting CID, with incremental benefit when used together (AUC 0.92). Yet this required on average 730 seconds (> 12 min.) to complete, and clinician feedback suggested this was not reasonable for primary care settings. To address this, we examined AUC for one vs. two trials of PSM, dropping the time to <7 min. (416 seconds) with similar diagnostic utility (AUC 0.90).

Conclusions: The MyCog paradigm for detecting CID in primary care demonstrated considerable accuracy, and its two-step process may be scalable for resource-constrained primary care settings.

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S. RAO, J. ALBERTS & D. SCHINDLER. Identification of Preclinical and Prodromal Alzheimer's Disease Using the Cleveland Clinic Cognitive Battery (C3B) in a Primary Care Setting.

Objective: Alzheimer's disease (AD)-related neuropathological changes begin as much as a decade prior to diagnosis. Biomarkers can detect these changes during the preclinical and prodromal (Mild Cognitive Impairment) stages. The high costs of PET and CSF biomarkers, however, make wide scale screening impractical. Longitudinal studies indicate a long period of gradual cognitive decline in healthy elders who convert to AD, suggesting that cognitive testing could serve as a low-cost mass screening technique.

Participants and Methods: Cleveland Clinic Cognitive Battery (C3B) is a reliable and valid, iPad-based cognitive test battery consisting of measures of episodic memory, processing speed, and task switching. The C3B is currently being used in Cleveland Clinic primary care clinics. Patients undergoing Medicare Annual Wellness Visits complete the self-administered 15-minute battery in the waiting room. Raw data are then transferred instantaneously to the cloud, where raw scores are converted to standardized normative z-scores that adjust for demographic variables. An average composite z-score is inserted into the electronic medical record (EMR) for review by a physician during the same visit. Separate cut-offs are used to distinguish subtle (z<-1.0 and >-2.0) from impaired cognitive performance (z<-2.0).

Results: Patients with subtle deficits are provided information about lifestyle changes that may reduce chances of developing AD (e.g., increasing physical activity). Patients in the impaired range are referred for a dementia workup. Accuracy in detecting MCI is determined through the patient's EMR.

Conclusions: This project is unique in integrating cognitive screening into routine primary care clinical practice. Such screening is a potential first step in selecting elders for drug and lifestyle interventions designed to slow or prevent the progression of AD during the preclinical and prodromal stages.

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R.M. BUSCH, O. HOGUE, M.P. SENGUPTA, S. MCCORMICK & D.P. FLODEN. The Brief Assessment of Cognitive Health (BACH): An Automated Tool to Detect Cognitive Impairment in Adults.

Objective: There is growing recognition in the medical community of the important health, psychosocial, and financial benefits of identifying cognitive problems in a range of disorders and age groups. Most available screening tools have been developed and validated for use in older adults at risk for neurodegenerative disorders, leaving physicians without suitable tools to screen cognition in younger individuals or non-degenerative neurological populations. This has led to a high demand for neuropsychological services resulting in long waitlists at many centers. In our experience, up to a third of referrals have cognitive complaints attributable to non-neurologic factors. Introduction of a valid and reliable screening tool for general medical use would provide decision support for cognitive referral and help optimize patient care.

Participants and Methods: The Brief Assessment of Cognitive Health (BACH) is a computerized screening measure that is self-administered using an iPad and headphones. It takes approximately 10 minutes to complete and can be used in a clinic office or waiting room. The BACH has been administered to large patient and community samples of adults

(aged 18 and over) in order to examine its psychometric characteristics and utility in identifying patients with a bona fide cognitive problem.
Results: The BACH demonstrates good concurrent and discriminant validity with established neuropsychological measures and predicts neuropsychological evaluation outcome with approximately 80% accuracy. The BACH provides clinicians with a probability estimate that their patient would exhibit cognitive problems on a full neuropsychological evaluation. It also provides a list of patient-reported concerns and referral recommendations based on BACH responses.
Conclusions: The BACH is a brief, computerized cognitive screening tool for population health that can aid clinicians in identifying cognitive problems in general medical populations.
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K.L. POSSIN, S. ERLHOFF, A. BERNSTEIN, K.A. DORSMAN, S. LANATA, K. ROGERS, J. KRAMER & K. RANKIN. The UCSF Brain Health Assessment for the Detection of Cognitive Impairment, Including Dementia, in Primary Care.
Objective: Cognitive impairment, including dementia, is underdiagnosed in primary care. Our objectives were to evaluate the detection accuracy of the UCSF Brain Health Assessment (BHA), a 10-minute tablet-based assessment, and to understand what primary care providers would need to increase cognitive assessment frequency.
Participants and Methods: Neurologically healthy controls (N=258) and cognitively impaired patients (98 with MCI and 72 with dementia), diagnosed by consensus conference, completed the BHA and two widely-used brief cognitive assessments: the MoCA and the MMSE. A preliminary sample of Spanish-speaking controls (20) and patients (12) were additionally assessed with the Spanish BHA. Discriminant function analyses tested classification accuracy for each assessment. We surveyed a national sample of 100 primary care providers nationally and conducted interviews with providers locally.
Results: At 85% specificity, the BHA had 92% sensitivity to cognitive impairment, which was higher than 66% for the MoCA and 58% for the MMSE in the same sample. Area under the curve was .97, .87, and .84, respectively. The AUC for the Spanish BHA was similar (.96). Of the providers surveyed, only 20% reported high confidence in their ability to interpret cognitive testing results, and only 21% in their ability to recognize when a patient has a neurocognitive disorder. Confidence around detection, diagnosis, and management of cognitive disorders correlated with assessment frequency. Providers interviewed highlighted the need for automated cognitive test interpretation with care recommendations and EMR integration.
Conclusions: The BHA is highly accurate at detecting cognitive impairment, and preliminary data suggests similar accuracy for the Spanish version. Guided by provider feedback, when we implement the BHA in primary care we will include an automated summary report, guidance on next steps for evaluation and care, and EMR integration.
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AM Coffee Break Sponsored by Kessler Foundation

10:30–10:45 a.m.

Poster Session 10. Imaging, Neuroscience, & Cross-Cultural

10:45 a.m.–12:00 p.m.

Cognitive Neuroscience

S. BALASUBRAMANIAN, J. FLEURIMONT, J.J. MANLY, D. DEVANAND & A.M. BRICKMAN. Exploring the Relationship Between Olfaction and Cognition in Diverse Middle-Aged Adults.
Objective: Olfactory dysfunction is associated with the diagnosis and progression of Alzheimer's disease (AD) among older adults, possibly due to the deposition of tau pathology throughout the olfactory network. However, there is little known about the correlates of olfactory functioning in middle-aged adults, prior to the clinical manifestations of AD. The purpose of this study was to examine the relationship between olfactory function and other measures of cognition in middle-aged adults from diverse racial and ethnic backgrounds.
Participants and Methods: Participants included 244 middle-aged adults (52.35+years, 57 women, 11% white, 39% Black, 50% Hispanic). As part of a comprehensive clinical evaluation, participants were administered the Brief Smell Identification Test (BSIT) to evaluate olfaction and the NIH Toolbox to evaluate cognition. The BSIT includes 12 items and requires participants to match the perceived scent to one of four possible responses. The NIH Toolbox cognitive battery includes tests that evaluate working memory, executive abilities, language, and processing speed. We explored the relationship of performance on the BSIT with demographic factors and fully demographically adjusted cognitive tests scores.
Results: Higher BSIT scores, representing more accurate olfactory performance, were associated with higher number of years of education and better performance on the List Sorting Working Memory Test, Picture Vocabulary Test, and the Dimensional Change Card Sort Test. BSIT performance was not associated with sex/gender, age, Pattern Comparison Processing Speed Test, and the Flanker Inhibitory Control and Attention Test in NIH Toolbox.
Conclusions: Performance on measures of olfactory function in midlife are related to certain cognitive abilities such as working memory and executive abilities. The assessment of olfaction may complement comprehensive neuropsychological evaluation of aging adults from diverse populations.
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A.I. BURNS, M. OZCAN, K.C. SHEPARD, J. VANUK, A. ALKOZEI & W. KILLGORE. The Association Between Monrningness-Eveningness and Nightmares in PTSD.
Objective: Individuals with a morningness preference (MP) prefer earlier wake and bedtimes in comparison to those with an eveningness preference (EP), who prefer later wake and bedtimes. Previous work has found that an EP is associated with a greater frequency of nightmares. Individuals with post-traumatic stress disorder (PTSD) are more likely to have an EP, as well as experience a greater frequency of nightmares. Daily morning blue light therapy (BLT) has been used to treat sleep disorders and phase advance circadian rhythms, leading to earlier wake-up times and is being explored as a treatment for PTSD. It is not known whether BLT could improve frequency and severity of nightmares for individuals with PTSD. Here we examined whether trait differences in morningness-eveningness were associated with changes in nightmare frequency following six-weeks of BLT vs a placebo light therapy.
Participants and Methods: Fifty-four individuals (53.7% female, Mean age =30.66, SD =8.15) with a clinical diagnosis of PTSD were administered the Morningness-Eveningness Questionnaire (MEQ) to assess self reported preference of time of wake and sleep. Participants

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also completed the Disturbing Dreams and Nightmare Severity Index (DDNSI) as a measure of nightmare severity and frequency.
Results: The associations between MEQ and DDNSI did not differ between BLT (r = -.331, p =.180) and placebo light condition (r = -.481, p =.027), with the sample as a whole showing a significant negative association between morningness-eveningness and change in nightmare severity (r = -.410, p =.010).
Conclusions: A greater MP was associated with a decrease in nightmare severity while greater EP was associated with an increase in nightmare severity, regardless of light treatment. Since light treatment was administered regularly in the morning, the morning structure may be more beneficial to those whom already have a MP, but may be disruptive for those with an EP. Further research is needed to fully understand the impact of EP on nightmares for PTSD.
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P.M. GARCIA-EGAN, R.H. PAUL & R. PRESTON-CAMPBELL. Early Life Stress and Sex Interactions on Self-ratings of Prospective and Retrospective Memory in Healthy Adults: A Pilot Study.
Objective: The present study examined the interaction between reported exposure to early life stress (ELS) and sex on self-reported prospective and retrospective memory (PRM).
Participants and Methods: Sixty-four healthy adults (36% males) with an average age of 66 (range: 53-85) and 16 years of education completed the Early Life Stress Questionnaire, the Depression, Anxiety and Stress Scale and the Prospective Retrospective Memory Questionnaire (PRMQ) at baseline and at 2-year follow-up. Exclusionary criteria included neurologic disorder, major psychiatric illness, and substance use disorder. Participants were classified as ELS- if they reported 0-1 ELS events before age 18 (n= 19; M=7; F=12) and ELS+ if they reported 2 or more ELS events before age 18 (n= 45; M=17; F=28).
Results: Groups were similar in age and years of education. There were no group differences in depression, anxiety and stress. A two-way Multivariate Analysis of Variance revealed a significant interaction of ELS and sex (Wilks' Λ= 0.847, $F(2, 59)$= 5.35, p<.05). ELS- males reported better total prospective memory ($F(3, 60)$= 7.36, p<.01), total retrospective memory ($F(3, 60)$= 3.04, p<.05), and total PRMQ scores ($F(3, 60)$= 5.69, p<.05), compared to ELS+ males and ELS +/- females.
Conclusions: Self-reported difficulties in PRM were most problematic in males with ELS; self-reported difficulties in PRM did not vary by ELS status among females. These results suggest a differential impact of ELS on PRM perception in males. However, due to the limited cell sizes in the present study, larger studies are needed to confirm the interaction of ELS and sex on PRM self-reports and to differentiate whether self-reported PRM is associated with PRM performance in ELS+ individuals or with personality traits such as neuroticism.
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X. PRATS SOTERAS, M. JURADO, J. OTTINO-GONZÁLEZ, I. GARCÍA-GARCÍA, X. CALDÚ, S. LUÍS-RUIZ, I. MATÉS, M. SENDER-PALACIOS, M. SÁNCHEZ-GARRE, N. MIRÓ, T. FONT, E. TOR & M. GAROLERA. Alterations in Cognitive Function in Healthy Obese Adolescents.
Objective: To explore the relationship between cognition and obesity in adolescents
Participants and Methods: One-hundred and thirty-five healthy adolescents without psychiatric, neurological, nor metabolic diagnosis, and aged from 12 to 21 (mean age 15.62 ± 2.66, 51.9% female), were assessed in several cognition domains such as speed processing, memory and executive functions. The Trail Making Test A, the Grooved Pegboard Test (average both hands) and the Color-Reading in Stroop Test served all to create a speed processing index. The delayed free recall of the California Verbal Learning Test and the delayed score of the Rey Complex Figure compose both a memory index. An executive function index was constituted by the Controlled Oral Word Association Test (FAS), the Trail Making Test B-A, the perseverative errors of Wisconsin Card Sorting Test and the stroop interference (part 3 - [part 1 + part 2/2]) from the Stroop Test. A composite of the Body Mass Index (BMI) and the waist-to-height ratio (WtHR) was used to as a measure of adiposity and body mass increase (obesity index). The WtHR was the result of dividing waist circumference by height (in centimeters). The effects of age and sex were controlled. A Pearson correlation was performed between obesity index and the standardized residuals of speed processing and memory indexes. Likewise, a Spearman correlation were conducted with the standardized residuals of executive index. These analyses were performed using IBM SPSS Statistics (v.23.0).
Results: A higher obesity index was related to cognitive slowness (r= - 0.315, p < 0.001), worst performance in memory function (r= -0.287, p= 0.001), and poorer executive functioning (r_s= -0.208, p= 0.016).
Conclusions: Regardless the potentially biasing effects of age and sex, the results show that an increase in body mass and adiposity is related to alterations in different cognitive domains. This could impact negatively in further eating behavior promoting bad intake habits that could lead to obesity or its maintenance.
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S. GRUBER. Going Green? Exploring the Impact of Medical Marijuana Treatment on Cognition and Brain Function.
Objective: Although previous work has underscored the negative impact of recreational MJ use on the brain, medical marijuana (MMJ) use may result in different outcomes. To address this question, we designed an observational, longitudinal study, which explores the impact of MMJ treatment on measures of cognitition, brain structure and function as well as other health-related measures.
Participants and Methods: Forty patients seeking MMJ treatment for a variety of indications are currently enrolled in our ongoing longitudinal study. At baseline, *prior to* beginning MMJ treatment, all completed a neurocognitive battery and measures of clinical state, quality of life, sleep, and conventional medication use, while a subset also completed multimodal neuroimaging measures. To date, the majority of patients have returned for at least their first follow-up visit three months after initiating treatment.
Results: After initiation of treatment, results suggest that relative to baseline, MMJ patients experienced improvement on several measures of executive functioning. Further, fMRI data revealed changes in brain activation patterns which were accompanied by improvements in task performance during the Multi-Source Interference Test (MSIT) and Stroop Color Word Test. Patients also reported improvements in clinical state, sleep and health-related measures, and decreased conventional medication use.
Conclusions: Data suggest that MMJ patients exhibit some *improvements* on measures of executive function, which are accompanied by potential *normalization* of brain activation patterns. These findings are particularly interesting given that recreational MJ users typically exhibit *deficits* in these measures relative to non-MJ users. Potential reasons for these improvements include primary symptom alleviation, older age of onset of MJ use (i.e., past the period of neurodevelopmental vulnerability), direct or indirect impact of individual cannabinoids, or reduction of conventional medications.
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Y. GAZES, Y. STERN & C. HABECK. Relative Predictive Power of fMRI Voxel-Wise Activation vs. Functional Connectivity for Behavior.

Objective: Given the widespread use of fMRI data to predict task performance, this study assessed the relative predictive power of voxel-wise functional activation vs. functional connectivity (FC) for behavioral performance.

Participants and Methods: Two hundred forty-six participants underwent fMRI while performing 12 cognitive tasks, covering each of the 4 cognitive domains Episodic Memory, Fluid Reasoning, Perceptual Speed, and Vocabulary ability, with 3 tasks per domain. Voxel-wise activation maps were obtained from first-level GLM in FSL. Further, FC were computed after "scrubbing" and motion confound regression to produce connectivity matrices for 264 ROIs (Power et. al, 2011). The age of the participants ranged from 21 to 80 years (median = 51 years). Split-sample simulations were performed with a minimum of 200 iterations for which the data were repeatedly portioned into a training set of 120 participants with up to 120 participants in the set. Principal component regression was performed in the training set for both voxel-wise activation maps and functional connectomes to predict performance.

Results: Voxel-wise prediction showed higher proportions of significant predictions at $p<0.01$ than FC for Memory (voxel: .37 - .91; FC: 0.0 - .05) and for Vocabulary tasks (voxel: .24 - .84; FC: .02 - .48). On the other hand, connectivity-based predictions showed higher proportions of significant prediction for Fluid Reasoning (voxel: .1 - .88; FC: .84 - 1.0) and Perceptual Speed tasks (voxel: 0 - .64; FC: 0.0 - .87).

Conclusions: Results indicate greater reliance on more localized activity for Memory and Vocabulary and on more globally distributed networks for Fluid reasoning and Perceptual speed for task processing. However, for all but 3 tasks, regardless of the overall significance level, combining information from both modalities improved the prediction, hinting at unique contributions from both local and network levels.

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M. KIM & E. NA. Decision-Making Deficits in Female College Students with Anorexia Nervosa Symptoms.

Objective: This study investigated deficits of decision-making in female college students with anorexia nervosa (AN) symptoms using the Iowa Gambling Task (IGT). Deficits of decision-making in AN patients draw attention, since AN patients prefer immediate reward in spite of negative consequences in the long run, and these deficits predict the prognosis of AN.

Participants and Methods: Based on the scores of the Korean version of Eating Attitude Test-26 (KEAT-26) and the Eating Disorder Examination Questionnaire, nonclinical AN (nAN) group (n=42) and control group (n=43) were determined. Decision-making ability was measured by computerized IGT

Results: The results showed that the nAN group exhibited significantly lower total net score ($F(1,80)=9.24$, $p<.01$) and block net scores of 3rd ($F(1,80)=6.05$, $p<.05$), 4th ($F(1,80)=7.67$, $p<.01$) and 5th ($F(1,80)=9.54$, $p<.01$) blocks than control group. Additionally, the nAN group selected significantly more A and B cards (disadvantageous cards) and less D card (advantageous card) than control group. In addition, the block net scores of the nAN group did not differ across the five blocks ($F(4,164)=1.64$, ns), whereas those of the control group increased as the blocks progressed ($F(4,168)=12.26$, $p<.001$). There was a significant negative correlation between IGT total net score and total score of the KEAT-26 ($r(42)=-.24$, $p<.05$), with more AN symptoms lower total net scores of the IGT in nAN group. This correlation was not observed in the control group.

Conclusions: These results indicate that female college students with AN symptoms have deficits of decision-making, which seem to be related with difficulties in set-shifting frequently observed in AN patients, and the tendency to make a decision based on immediate cues in spite of negative consequences in the long-run. Present results also indicate that deficits of decision-making could be served as a trait marker of AN.

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B. LEES, L. MEWTON, L. STAPINSKI, L. SQUEGLIA, C. RAE & M. TEESSON. The Cause-Effect Relationship of Binge Drinking and Neural and Cognitive Dysfunction: Evidence From a Systematic Review.

Objective: Binge drinking during adolescence and early adulthood has a higher potential for neurotoxicity and interference with ongoing neural and cognitive development. The purpose of this review was to provide the first systematic and quantitative synthesis of the literature examining the impact of binge drinking on cognition, brain structure and function in youth aged 10 to 24 years.

Participants and Methods: A total of 2,587 studies from five peer-reviewed databases were systematically screened against eligibility criteria designed to synthesise studies that examined young binge drinkers and used neuropsychological, neurophysiological or neuroimaging techniques. Studies were excluded if participants had been clinically diagnosed with an alcohol use disorder, or any psychiatric, neurological or pharmacological condition.

Results: A total of 57 studies (21 neuroimaging, 20 neuropsychological, 16 neurophysiological) met the eligibility criteria and were included in the review. A meta-analysis of neuropsychological correlates identified that binge drinking in youth was associated with deficits in affective decision-making (g= -1.84), learning (g= -0.68) and inhibition (g= -0.32). Vulnerability factors that may predispose youth to binge drink included smaller brain volume and surface area, attenuated growth in white matter structures, aberrations in brain activity during executive functioning tasks, and poorer affective decision-making ability. These factors were further exacerbated by the uptake of binge drinking, in addition to deficits in delay discounting, visuospatial functioning and attention.

Conclusions: This review is the first to synthesise neuropsychological, neurophysiological and neuroimaging studies examining binge drinking in youth. Affective decision-making, learning capacity and executive functioning skills have been identified as potential training targets for prevention and early intervention initiatives to avert the effects of long-term use.

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A.H. LEQUERICA, N.D. CHIARAVALLOTI, I. WARD & N. JASEY. The Effect of Sleep on Procedural Learning After Brain Injury.

Objective: Among healthy individuals, sleep after a period of procedural learning has been found to boost performance in the absence of additional practice compared with an equivalent period of time spent awake. The objective of this study was to evaluate the effect of a 30-minute nap after a period of motor learning in a sample of individuals with acquired brain injury (ABI).

Participants and Methods: Eighteen individuals with ABI from an inpatient rehabilitation facility were trained on a sequential tapping task. Following the training sessions, they were given a 30-minute span of time to either take a brief nap, or remain awake and resting. A crossover, repeated measures design was used such that each participant completed both nap and rest conditions in counterbalanced order. The average number of correct sequences upon retesting after the intervention was calculated. The change in performance from the end of training to the post-intervention trials served as the dependent variable in a repeated-measures ANCOVA with nap vs. rest condition as the independent variable. Covariates controlled for order effects and learning capacity (calculated as a change in performance across the learning trials).

Results: The nap intervention resulted in a significantly greater increase in correct sequences compared with the rest condition, $F(1,15)=6.9$, $p=0.019$, $\eta_p^2=0.32$. Partial eta-squared indicated a large effect size. The

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nap resulted in an 18% increase in performance compared with the 3% increase observed after the rest condition.
Conclusions: Sleep after a period of motor learning can boost performance among individuals with ABI. This has important implications for acute rehabilitation where the learning or re-learning of motor skills may be the focus of intervention to improve functional independence. Further studies are needed to determine whether the routine placement of a nap after intensive physical or occupational therapy can enhance the efficiency of rehabilitation after ABI.
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L.D. PICCOLO, N. BECKER & J.F. SALLES. Effects of Socioeconomic Status on Neuropsychological Performance vary by age Groups in Brazilian Children.
Objective: Family socioeconomic status (SES) seem to affect performance in memory, language and executive functions. Such influence is more prominent at younger ages, until about ten years old. In the present study, neuropsychological variables (memory, oral and written language and executive functions) were added to IQ evaluation in order to investigate the impact of family SES between age ranges in their cognitive development.
Participants and Methods: Participants were 419 Brazilian children aged 6–12 years old, attending public and private schools from south of Brazil. The children were assessed in measures of non-verbal IQ, memory, language and executive functions. Parental education were assessed with a survey of the brazilian index (combining parental education and income) that characterizes the family SES. Structural equation modeling was conducted to evaluate the relationship between SES, age and neuropsychological performance.
Results: Structural equation analyzes revealed that in the general model (for all ages), SES explained 19-28% of the cognitive performance – IQ, verbal memory, working memory, oral and written language and executive functions (28, 19, 36, 28 and 25 %, respectively). Also, there was a statistically significant difference of SES effects on neuropsychological performance between age groups: 6/7 and 8/9 years old ($\chi^2(10) = 27.9, \chi^2/gl = 2.79; p < 0.05$), between 6/7 and 10/11/12 years old ($\chi^2(10) = 115.475$, $\chi^2/gl = 11.547$; $p < 0.05$) and between 8/9 and 10/11/12 years old ($\chi^2(10) = 87.57$, $\chi^2/gl = 8.757$; $p < 0.05$). The children with lower SES had lower performance regarding IQ, memory, written language, and inhibitory control tasks than those with higher SES ($p < 0,05$).
Conclusions: Our results showed that SES effects on cognition decline after 9 years old. We hypothesize that after this age, a combination of factors such as schooling, living in other social environments, may mitigate the effects of family SES. Those findings has implications for the timing of both screening and intervention efforts.
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K. SAGAR, M.K. DAHLGREN, R. SMITH, A. LAMBROS, M. KUPPE & S. GRUBER. Highs and lows: distinct patterns of change across cognitive domains during medical marijuana treatment.
Objective: Although cognitive decrements have previously been reported among recreational marijuana (MJ) users, few studies have examined whether medical marijuana (MMJ) patients exhibit similar cognitive decrements. As recreational MJ users and MMJ patients often differ in terms of reasons for use, product selection, and age of onset, it is imperative to examine whether cannabis may exert a differential impact on cognition when used for medical purposes.
Participants and Methods: As part of a larger study, MMJ patients were assessed before initiating MMJ treatment, after 3 months of treatment, and again after 6 months of treatment. Across visits, patients completed a comprehensive neurocognitive battery, including frontal/executive measures and the Rey Auditory Verbal Learning Task (RAVLT), a measure of verbal learning and memory.
Results: As previously reported, following 3 months of treatment patients demonstrated improvements on measures of executive function which were generally sustained across 6 months of treatment. In contrast, on the RAVLT, patients demonstrated significant but temporary impairments in verbal learning and memory over the course of MMJ treatment; decrements observed after 3 months of treatment improved after 6 months, in some cases reflecting similar performance as observed during baseline assessments.
Conclusions: Taken together, results suggest that verbal learning decrements may be transient among MMJ patients, resolving after patients habituate to MMJ use. Future research is needed to examine patterns of cognitive performance across additional domains and over the course of longer MMJ treatment periods. In addition, studies examining potential moderating variables, including frequency and magnitude of use as well cannabinoid levels in patients' products, are an important future step.
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B.C. SATTERFIELD, K. LAFOLLETTE, M. LAZAR & W.D. KILLGORE. Prolonged Psychosocial Stress Impairs Cognitive Flexibility.
Objective: Stress is prevalent in everyday life and can have significant effects on cognitive functioning. Specifically, stress can directly impact cognitive control mechanisms which allow us to think flexibly, make crucial decisions, and rapidly update behavior under changing circumstances. Here we sought to determine if cognitive flexibility is significantly impaired in individuals that are vulnerable to a prolonged social stressor compared to those that are resilient.
Participants and Methods: 52 healthy adults (21.6±2.9 y; 35 females) were placed in either a positive, neutral, or negative mood state, and then performed a modified Trier Social Stress Test (TSST). The TSST was divided into 3 stress phases: preparation, delay, and speech/oral subtraction. Between stresses, subjects performed a novel reversal learning task based on a standard go/no-go paradigm. Stimulus-response rules were presented at the beginning of the task, then subjects were asked to either respond or withhold a response to the presented stimuli. These stimulus-response rules were reversed halfway through the task. Performance was assessed as a change in discriminability (d') index, hit rate (HR), and false alarm rate (FAR) from pre- to post-reversal. Stress reactivity was quantified based on salivary cortisol concentrations at 8 time points throughout the stress protocol.
Results: Pearson's partial correlation, controlling for baseline cortisol, mood, and gender, showed a significant relationship between cortisol response and task performance. Subjects with higher cortisol levels had a larger decrease in pre- to post-reversal performance for d' ($r=-0.36$, $p=0.011$) and HR ($r=-0.42$, $p=0.003$), but not FAR ($r=0.24$, $p=0.091$).
Conclusions: Individuals vulnerable to stress (i.e., higher cortisol response) had significantly impaired cognitive flexibility compared to those that were resilient. The inability to remain flexible and update behaviors appropriately under stress can lead to impaired professional and interpersonal interactions.
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J. WON, A. ALFINI, L.R. WEISS, C. MICHELSON, D.D. CALLOW & J. SMITH. Impact of Acute Exercise on Semantic Memory Activation in Healthy Older Adults.
Objective: Regular exercise is associated with enhanced cognitive function in older adults. However, very little is known about the effects of single sessions of exercise on brain activation during memory retrieval. This study investigated the effects of acute exercise on brain activation during discrimination of Famous names and Non-Famous names in

healthy older adults (ages 65-85) using functional magnetic resonance imaging.
Participants and Methods: Using a within-subjects counterbalanced design, 30 participants (ages 55-85) underwent two experimental visits on separate days. During each visit, participants engaged in 30 minutes of rest or 30 minutes of moderate intensity stationary cycling exercise prior to fMRI scanning and performance of a Famous Name Discrimination Task (FNDT).
Results: There were no significant differences in FNDT response time or accuracy after exercise compared to rest. However, after acute exercise there was significantly greater semantic memory-related activation (Famous > Non-Famous, $p < .05$ corrected) in several cortical regions, including bilateral fusiform, left superior and middle temporal gyri, bilateral parahippocampal gyri, and bilateral hippocampal regions.
Conclusions: We have previously reported that 12 weeks of exercise training in healthy older adults resulted in a reduction in brain activation during the FNDT (Smith et al., 2013). Greater brain activation following a single session of exercise suggests that exercise may increase neural processes underlying semantic memory activation in healthy older adults. These effects were localized to the known semantic memory network, and thus do not appear to reflect a general or widespread increase in brain blood flow. Coupled with our prior exercise training effects on semantic memory-related activation, these data suggest the acute increase in neural activation after exercise may provide a stimulus for adaptation over repeated exercise sessions.
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R. SMITH, M.K. DAHLGREN, K. SAGAR, A. LAMBROS, M. KUPPE & S. GRUBER. What's in Your Weed? Effects of THC and CBD on Clinical State and Executive Function in Medical Marijuana Patients.
Objective: Marijuana (MJ) contains over 100 phytocannabinoids that modulate activity of the body's endocannabinoid system, involved in regulating various physiological and cognitive processes. The two most common phytocannabinoids are Δ9-tetrahydrocannabinol (THC), the main psychoactive constituent in MJ, and cannabidiol (CBD), the primary non-intoxicating constituent often touted for its therapeutic potential. Thus far, no studies have evaluated the differential impact of THC and CBD on clinical state and cognition in medical marijuana (MMJ) patients over the course of treatment.
Participants and Methods: As part of a larger longitudinal study, patients were assessed before beginning MMJ and after three months of MMJ treatment on measures of cognition, clinical state, and quality of life. In order to analyze the differential impact of THC versus CBD on clinical state and cognition, patients were divided into those with primarily THC-dominant (THC-Dom) or CBD-dominant (CBD-Dom) treatment regimens.
Results: Following three months of treatment, the CBD-Dom group reported improvements in self-reported ratings of depression and anxiety, while the THC-Dom group either showed decrements or less improvement than the CBD-Dom group. Interestingly, both groups reported improvements in quality of life and performed better on tasks of executive function after three months of treatment regardless of regimen type.
Conclusions: These preliminary data suggest that "what's in your weed" may be of critical importance in determining the impact of MMJ on clinical state, but also suggest that improvements in executive function and quality of life may not be specific to THC or CBD, and could be related to other moderating variables associated with MMJ use (e.g. primary symptom improvement, decreased conventional medication use). Clinical trial models may be ideally suited to address the impact of individual cannabinoids on outcome measures.
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A. UECKER & M. HALL. Assessment of Intra-Variability in Composite Area Intellectual Scores over Repeat Neuropsychological Evaluation in a Pediatric Clinical Population.
Objective: Investigations of neurodevelopmental changes in childhood have found structural and functional brain changes associated with developing neurocognitive skills occurring through childhood and adolescence. The purpose of the current study was to compare and contrast the specific intra-variability in the composite intellectual profile areas in a pediatric clinical population evaluated in repeat neuropsychological testing. Previous work with the same data set showed statistically significant general intellectual profile intra-variability at both time one (mean variability was 1.40) and time two (mean was 1.85), with the time two intra-variability being significantly greater as compared to time one. This variability was despite the lack of a significant difference in the mean intellectual ability or composite area standard scores.
Participants and Methods: The sample consisted of 26 children, mean age 11.73, SD= 2.90. Each was assessed with the Wechsler Intelligence Scale for Children – Fourth or Fifth Edition. Each had two standardized test occasions occurring at an average of 2.62 years apart, many with the same examiner.
Results: Whereas composite area variability comparisons at time one were all nonsignificant, three of the six possible composite area comparisons at time two were statistically significant ($p<.05$): verbal comprehension vs working memory, verbal comprehension vs processing speed, and perceptual reasoning vs working memory. In a direct contrast of the composite area variability comparions at time one and time two, statistical significance occurred only between verbal comprehension and perceptual reasoning ($p=.05$).
Conclusions: Intra-variability in intellectual test profiles either on a single or over multiple test occasions has the potential to inform neuropsychologists about brain vulnerability. Work is ongoing to further understand client factors that contribute to this variability and what profile variability may mean for the client with regard to their brain, psychological and overall health.
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M. VAN KESSEL, J. VAN DER VLUGT, H. SPAANS, J. MURRE & E. VERWIJK. Pre-Treatment Predictors of Cognitive Deficits in Depressed Patients Treated with Electro Convulsive Therapy (ECT), A Systematic Review.
Objective: There are considerable individual differences in cognitive side effects following ECT. There is great clinical need for additional knowledge about pre-treatment (before ECT) predictors, which can identify those patients at higher risk for developing cognitive deficits. Identifying these patients can improve treatment policy, psycho-education and possibly even reduce cognitive side effects.
The aim of this review is to evaluate what is currently known about pre-treatment predictors of cognitive deficits in patients treated for depression with ECT.
Participants and Methods: A systematic literature review of the Medline, Embase and PsychInfo databases between 2002-2018 was performed, according to the Prisma protocol. Inclusion and exclusion criteria were formulated for full-text inclusion. Data extraction, quality assessment were performed, levels of evidence were assessed and will be displayed.
Results: Initially, there were 1482 search results. After screening the titles and abstracts, 150 articles proved eligible for full-text evaluation, of which 14 were included. Pre-treatment predictive factors are suggested at multiple levels: 1) demographic (age & gender), 2) clinical (cognitive functioning pre ECT, cognitive reserve & bipolar depression),

3) neurobiological (white matter hypodensity & plasma amyloid levels) and 4) biomarker (genetic profile).
Conclusions: Current knowledge about pre-treatment predictors of cognitive deficits in patients treated for depression with ECT was reviewed. Moderate to strong levels of evidence are found on demographic, clinical, neurobiological and biomarker levels.
However, research primarily focusing on cognitive performance is scarce and has been done predominantly on a groupmean outcome level, which is not representative for the individual patient. In addition, recent studies show significant variation in cognitive outcome on an inter-individual level.
Future research, primarily focusing on pre-treatment predictors of cognitive deficits on an inter-individual level is needed.
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C. VEGA, R. DIVERS, T. GIOVANNETTI & E. ROLL. Everyday Multi-tasking is Disrupted by Error Detection and Correction.
Objective: Numerous studies have shown that people typically slow down and improve their performance after they make an error on a cognitive task due to compensatory increases attention and cognitive control(i.e., post-error slowing, post-error increased accuracy). However, post-error processing has not been investigated during multitasking. We evaluated whether post-error processing would improve everyday task performance while multitasking.
Participants and Methods: 19 healthy adults performed an everyday task(prepare lunch)with target and distractor objects on a tabletop while concurrently performing the Oral Trail Making Test(OTMT)to simulate everyday tasks performance during complex conversation. Errors on both the lunch task and OTMT were coded from video. Lunch errors were characterized according to whether or not they were temporally linked to an OTMT error(i.e., immediately before/after vs. not temporally linked to OTMT error). Lunch errors also were classified according to the speed at which they were detected/corrected(i.e., reaching but not touching an incorrect object– fast error monitoring failure; incorrect action corrected after it is completed-slow error monitoring).
Results: On average, participants made 4 total errors on the lunch task. Significantly more lunch errors were temporally linked to an OTMT error(overall 84% of errors; $t(19) = 6.22$, $p<.001$). In most cases(67%), an error on the lunch task occurred immediately following an OTMT error. There was a trend for errors that were temporally associated with an OTMT error to be corrected more slowly than lunch errors that were not temporally associated with an OTMT error.
Conclusions: Although the increased cognitive control and attention associated with error monitoring has been associated with performance improvements in single tasks, error monitoring processes substantially disrupt performance while multitasking. Implications for optimizing everyday multitasking by reducing errors or modifying error monitoring and error handling processes will be discussed.
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Inclusion and Diversity/Multiculturalism

F.L. WANG, T. ABOUEZZEDDINE, M.J. PHELAN, D.C. WANG & M.B. DICK. Language Proficiency as a Confounding Variable: The Association Between Neuropsychological Scores, Ethnicity, Language, and Acculturation in a Geriatric Asian Population.
Objective: The relationship between language proficiency and cognitive test performance was examined in a sample of 415 geriatric participants at a university-affiliated neuropsychological clinic;
Participants and Methods: 45 were bilingual Chinese individuals, and 370 were English-speaking Caucasians individuals. Significant ethnic and linguistic proficiency group differences were observed on tests of language, attention, nonverbal processing speed, and executive skills.
Results: Analyses revealed significantly higher performance for the English-speaking Caucasian participants on measures that may require greater language proficiency (Multilingual Naming Test, Animals, FAS, Number Span Tests, Information, and Similarities) compared to the bilingual Chinese participants. In addition, performance on the Multilingual Naming Test was significantly related to the age of language learning initiation and acquisition. Specifically, when Chinese participants started studying the English language, their years of education in English, the frequency with which they counted or talked to themselves in English, and how much they identified with the English language and culture, were all found to impact their performance on the Multilingual Naming Test.
Conclusions: These findings are consistent with prior literature that has looked at ethnic differences and the impact of acculturation on cognitive test performance. These results further emphasize the need for the development of ethnically and culturally appropriate normative databases and tests, as well as the concern of continuing to use normative data that is primarily derived from Caucasian monolingual populations.
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J. ARIAS, R. MENDOZA & A. LEVINE. NeuroShare: A Collaborative Web-based Approach to the Collection and Dissemination of Normative Data for Spanish-Speaking Populations.
Objective: As the U.S. Latino population grows exponentially, neuropsychologists are called to provide assessment services to this culturally diverse group of individuals. Neuropsychological research has limitations regarding equal representation of individuals from various ethnic/cultural backgrounds resulting in limited available neuropsychological measures and normative data. In response to the need for a centralized, widely accessible set of normative data for Spanish-speakers, the NeuroShare project developed a comprehensive, collaborative method for sharing such information.
Participants and Methods: A web-based platform was established for organizing and disseminating normative data for Spanish-speaking populations. Data was collected through a meta-analysis of current research, and organized by cognitive domain, education, age, and country. The platform offers direct access to normative data for clinical use, and for future contributions to improve the widespread availability of these tools.
Results: The NeuroShare database compiled 36-scholarly articles with normative data for 39-neuropsychological tests. Countries included Mexico, Spain, El Salvador, Honduras, and Cuba, among others. Performance validity, intelligence, attention/executive functioning, language, and memory were represented. A comprehensive, publically accessible and available means of data organization for neuropsychologists was created.
Conclusions: The NeuroShare project successfully developed a system for targeted identification of normative data to support the improvement of diagnostic clarity in the assessment of Spanish-speaking patients. This project provides a platform for ongoing, collaborative data source for future research and clinical use.
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J. BELSER-EHRLICH, E. TRIFILIO, C. HERNAIZ & D. BOWERS. Amnestic Mild Cognitive Impairment vs Frontal-Executive deficits? Importance of culturally appropriate assessment in a bilingual candidate for DBS surgery.
Objective: The neuropsychological exam plays an important role in interdisciplinary team-based approaches for determining candidacy for deep brain stimulation (DBS) surgery. Quantifying the nature and severity of cognitive deficits aids the neurosurgeon in DBS lead location

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decision making and helps identify dementia and atypical cognitive profiles that might result in less than optimal outcomes. Despite overwhelming evidence regarding use of cultural-linguistically appropriate assessments, these are not always conducted. In this case report, we describe a Parkinson's disease DBS candidate who had been misdiagnosed as amnestic mild cognitive impairment (MCI) and initially denied surgical options due to use of culturally inappropriate assessment.

Participants and Methods: A 76-year-old Hispanic woman with tremor dominant Parkinson Disease (PD) was seen for potential DBS by the UF Center for Movement Disorders. Despite the patient's ability to converse easily in English in her daily life, she had been educated in Spanish and learned English as a young adult. She underwent two comprehensive neuropsychological evaluations within a year, one in English at an outside setting, and the second in Spanish using measures with Ponton norms.

Results: Results from the initial evaluation in English revealed evidence of rapid forgetting on verbal recent memory measures including list learning and two novel stories, raising concerns for an amnestic disorder. A different pattern emerged when tested in Spanish. Results showed strong recent memory performance. Instead, relative weaknesses consistent with the frontal-subcortical involvement associated with PD were observed. Based on these findings, the patient was deemed a cognitively appropriate DBS candidate.

Conclusions: This case study highlights the importance of culturally appropriate neuropsychological assessment in DBS evaluations Use of an inappropriate tests can result in misdiagnosis that in turn affect treatment options and quality of life options.

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R.D. BENNETT, A.E. DATOC & C. GOLDEN. Effects of Diversity and Neuropsychological Performance in an NFL Cohort.

Objective: The aim of this study was to examine the effect of ethnicity on neuropsychological test performance by comparing scores of white and black former NFL athletes on each subtest of the WMS.

Participants and Methods: Data was derived from a de-identified database in South Florida consisting of 63 former NFL white (n=28, 44.4%) and black (n=35, 55.6%) athletes (M_{age}= 50.38; SD= 11.57). Participants completed the following subtests of the WMS: Logical Memory I and II, Verbal Paired Associates I and II, and Visual Reproduction I and II.

Results: A One-Way ANOVA yielded significant effect between ethnicity and performance on several subtests from the WMS-IV. Black athletes had significantly lower scores compared to white athletes on Logical Memory II: $F(1,61) = 4.667$, $p = .035$, Verbal Paired Associates I: $F(1,61) = 4.536$, $p = .037$, Verbal Paired Associates: II $F(1,61) = 4.677$, $p = .034$, and Visual Reproduction I: $F(1,61) = 6.562$, $p = .013$.

Conclusions: Results suggest significant differences exist between white and black athletes on neuropsychological test performance, necessitating the need for proper normative samples for each ethnic group. It is possible the differences found can be explained by the psychometric properties of the assessment and possibility of a non-representative sample for minorities, or simply individual differences. Previous literature has found white individuals to outperform African-Americans on verbal and non-verbal cognitive tasks after controlling for socioeconomic and other demographic variables (Manly & Jacobs, 2002). This highlights the need for future investigators to identify cultural factors and evaluate how ethnicity specifically plays a role on neuropsychological test performance. Notably, differences between ethnic groups can have significant implications when evaluating a sample of former athletes for cognitive impairment, as these results suggest retired NFL minorities may be more impaired compared to retired NFL white athletes.

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A.E. DATOC, R.D. BENNETT & C. GOLDEN. The Effect of Ethnicity on Neuropsychological Test Performance of Former NFL Athletes.

Objective: To investigate the effect of ethnicity on neuropsychological test performance by specifically exploring differences between white and black former NFL athletes on subtests of the WAIS-IV.

Participants and Methods: Data was derived from a de-identified database in Florida consisting of 63 former NFL athletes (M_{age}=50.38; SD=11.57); 28 white and 35 black. Participants completed the following subtests of the WAIS-IV: Block Design, Similarities, Digit Span, Matrix Reasoning, Arithmetic, Symbol Search, Visual Puzzles, Coding, and Cancellation.

Results: One-Way ANOVA yielded a significant effect between ethnicity and performance on several subtests. Black athletes had significantly lower scaled scores than white athletes on Block Design $F(1,61)=14.266$, $p<.001$, Similarities $F(1,61)=5.904$, $p=.018$, Digit Span $F(1,61)=8.985$, $p=.004$, Arithmetic $F(1,61)=16.07$, $p<.001$ and Visual Puzzles $F(1,61)=16.682$, $p< .001$. No effect of ethnicity was seen on performance of Matrix Reasoning $F(1,61)=2.937$, $p=.092$, Symbol Search $F(1,61)=3.619$, $p=.062$, Coding $F(1,61)=3.032$, $p=.087$ or Cancellation $F(1,61)=2.289$, $p=.136$.

Conclusions: Results reveal significant differences between white and black athletes on all subtests of the WAIS-IV but those from the Processing Speed Scale and Matrix Reasoning. These findings align with previous literature that found white individuals to outperform African-Americans on verbal and non-verbal tasks after controlling for socioeconomic and demographic variables (Manly & Jacobs, 2002). These differences may also be a reflection of the WAIS-IV's psychometric properties and it is significant to consider the normative sample used may not be appropriate for African-Americans. This study highlights the need for future research to identify how ethnicity specifically influences performance, sheds light on the importance of considering cultural factors when interpreting test results, and serves as a call to action to further understand how and why minorities may not be accurately represented in neuropsychological testing.

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E.C. DUGGAN & M. GARCIA-BARRERA. What factor structure best describes the Chilean WAIS-IV?

Objective: Accumulating evidence indicates the original factor structure published in the Wechsler Intelligence Scales may not best describe the data captured by these tests. Instead, the evidence supports a five-factor Cattell-Horn-Carroll (CHC) model over a four-factor Wechsler model and a bifactor model over a higher-order model (Benson et al., 2018; Gignac, 2016; Jewsbury et al., 2016). Considering most extant research focuses on North American samples, our study objectives were to examine the psychometric properties and determine the best model fit of the Chilean Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV; Wechsler, 2013).

Participants and Methods: Confirmatory factor analysis was used to evaluate the factor structure of the Chilean-WAIS-IV normative sample (ages 16-69, N=672). Specifically, the structure of four-factor (Wechsler) and five-factor (CHC) models were examined in the context of both bifactor and higher-order modeling using comparative fit indices.

Results: As hypothesized, CHC models fit better than Wechsler models (mean delta CFI=0.02 improvement). Bifactor models fit better than traditional higher-order models (mean delta CFI =0.02 improvement). Overall, a bifactor CHC model best fit the data (CFI=0.995, RMSEA=0.026).

Conclusions: This study's results are consistent with the growing literature supporting a bifactor CHC model as a more adequate description of Wechsler intelligence data. Additionally, this research contributes to much needed cross-cultural study of alternative WAIS-IV factor models. While results have implications for the clinical interpretation of the Chilean WAIS-IV (e.g., conceptualizing full-scale intelligence quotient as a breadth factor rather than a superordinate factor of index-level

abilities), further studies examining the clinical utility of WAIS-IV bifactor and CHC models are needed.
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C.M. FILANGIERI, H. ZHU & T. MAYER. The Role of Attention in Predicting Rehabilitation Outcome in a Culturally Diverse Population.

Objective: Sweet and colleagues (2011) found that scores on the attention subtest of the Montreal Cognitive Assessment (MoCA) were positively correlated to the functional independence of patients at discharge from an acute rehabilitation facility. Using a cutoff of 5 (out of 6 total possible points) on the attention subtest of the MoCA, the authors found that patients who were not attention-impaired showed significant functional improvement, as measured by relative functional gain (RFG) at discharge. The patient population in Sweet and colleagues' study represents a sample of individuals living in and around Ottawa, Ontario, a municipality that is predominantly Caucasian (2006 Canadian Census). The purpose of this study was to extend the findings of Sweet and colleagues' study to a predominantly African American population.

Participants and Methods: We collected data for 104 patients (46 male, 58 female) admitted to an urban acute rehabilitation facility who were age 55 and older, had the capacity to understand the nature of the research, and who agreed to participate in the study. We compared scores obtained on the attention subtest of the MoCA at admission to relative functional gain (RFG) and relative functional efficiency (RFE) at discharge.

Results: Overall, we found that RFG and RFE was positively correlated to MoCA total scores and RFG was positively correlated to MoCA attention scores. However, RFG and RFE were positively correlated to MoCA attention subtest scores in in female patients only. There were no significant correlations in the male patients.

Conclusions: Our findings suggest that attention plays a significant role in recovery of function in older, predominantly African American females admitted to an urban acute rehabilitation facility.
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C.M. FILANGIERI, N. OZURUMBA & T. MAYER. A Comparison of the MoCA Basic to the MoCA in Determining its Utility in the Prediction of Functional Recovery in a Diverse Patient Population Admitted to an Urban Acute Rehabilitation Facility.

Objective: Previously, we found that relative functional gain (RFG) and relative functional efficiency (RFE), as calculated from scores on the Functional Independence Measure (FIM) were positively correlated to scores obtained on the Montreal Cognitive Assessment (MoCA), and RFE was positively correlated to performance on the attention subtests of the MoCA (Filangieri et al, 2015). However, scores on the MoCA and the MoCA attention subtest did not correlate with the RFG and RFE in male participants. Furthermore, we noticed that participants performed poorly on executive functioning and animal naming subtests of the MoCA. In this study, we were interested in determining whether the MoCA Basic (MoCA-B), which was developed to test individuals who are illiterate or who have little formal education (<5 years), more accurately captured our patient population's current cognitive functioning. We were also interested in determining if alternate sequencing and animal naming tasks would be more culturally appropriate.

Participants and Methods: We collected data for 100 patients (50 male, 50 female) who were age 55 and older, had the capacity to understand the nature of the research, and who agreed to participate in the study. Participants were given the MoCA B along with an alternate sequencing task and animal naming task.

Results: We found that the MoCA-B attention subtest score were significantly and positively correlated to RFG in our male and female patients. However, there was no significant difference between means obtained on the MoCA in our previous study and those obtained on the MoCA-B in this study. Furthermore, there were no significant differences in scores on sequencing and animal naming tasks when compared to the alternate versions.

Conclusions: Our findings suggest that scores on the MoCA-B attention subtest may be more predictive of functional improvement in a diverse, urban population admitted to an acute rehabilitation facility.
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S. FRANZEN, E. VAN DEN BERG, M. GOUDSMIT, C. JURGENS, L. VAN DE WIEL, Ö. UYSAL-BOZKIR, T.R. NIELSEN & J. PAPMA. A systematic review of domain-specific neuropsychological tests and test batteries used in dementia diagnostics in non-Western, low educated, populations: cross-cultural applicability, reliability, validity and methodological quality.

Objective: In recent years, an increasing number of studies have focused on dementia screening instruments applicable in non-Western populations. However, to determine the dementia etiology, in-depth cross-cultural cognitive tests that take into account the effects of low education are urgently needed. The aim of this review was to 1) provide an overview of studies investigating domain-specific cognitive tests/test batteries used in dementia diagnostics in non-Western populations and 2) to examine the quality of these studies and how tests were adapted for other cultures and low education.

Participants and Methods: A systematic review using Medline, Embase, Web of Science, Cochrane, Psycinfo and Google Scholar was performed. Search terms included various terms for non-Western populations, neuropsychology/cognitive tests and dementia/MCI. Inclusion criteria were: the study 1) included MCI and/or dementia patients 2) was conducted in a non-Western population and 3) described the instrument in sufficient detail to judge its applicability in a non-Western context, its validity and/or reliability.

Results: 5360 articles remained after deduplication. 64 were included in the final selection. Remarkably, only 34 studies included patients with less than primary education. Most studies examined AD/MCI (35) or an unspecified dementia group (26). There were often large differences in the MMSE between AD and controls. A large number of memory tests were studied (14), whereas other domains, e.g. executive functions (3 tests), were understudied. Few *de novo* instruments were tested. Existing instruments were often used without first studying their cross-cultural and cross-linguistic properties.

Conclusions: Future research should take into account low educated populations, dementia subtypes other than AD, and other cognitive domains than memory. It is important to study cross-cultural/linguistic properties of Western test before using them in non-Western populations.
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A. GAVARRETE OLVERA, C.R. PAGAN & J. RAZANI. Effects of Obtaining Education In- or Outside of U.S. on Language Tests Performance in Hispanic Adults.

Objective: Years of education has been known to influence performance on neuropsychological tests and is often taken into consideration in the interpretation of the scores. However, how much of the education was obtained in the United States has received little attention. The purpose of this study was to further explore the role of education in Hispanic performance on two commonly administered neuropsychological language tests, Boston Naming Test (BNT) and FAS.

Participants and Methods: 54 Hispanic individuals recruited from the greater Los Angeles area participated. Years of education were categorized into three groups: all education in the U.S., all education outside of the U.S., or a combination of both inside and outside of the U.S. The BNT (confrontation naming test) and FAS (word production test) were administered as part of a larger neuropsychological battery.
Results: Using age as a covariate, ANCOVA analysis revealed that the education groups differed significantly on the BNT $F(2, 39) = 15.195$, $p < .001$ and FAS $F(2, 50) = 5.474$, $p = .007$. More specifically, individuals who received education solely outside of the U.S. performed worse on the BNT and FAS than those who received all their education in the U.S. or a combination of both inside and outside of the U.S.
Conclusions: Findings highlight that where the education was obtained is related to Hispanic performance on these language tests. Participants who obtained all of their education outside of the U.S. performed the worst of the three groups. The fact that participants who obtained even some of their education inside the U.S. performed similarly than those who obtained all of their education in the U.S., suggest that individuals benefit from exposure to the U.S. education system.
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N.A. MEDINA, L. OLABARRIETA-LANDA, E. VERGARA MORAGUES, D. RIVERA, J. FOLLECO & J.C. ARANGO-LASPRILLA. Variables associated with clustering and switching strategies during semantic verbal fluency tests in children from Bogota, Colombia.
Objective: To determine whether child's age and sex, and parents' mean educational levels (PMELs) are associated with semantic verbal fluency (SVF) total score, number of clusters and switches, and cluster size.
Participants and Methods: One-hundred children from Bogota, Colombia, participated in the study. The mean age was 11.82±2.68 and PMELs was 10.9±3.15 years. 62% were girls and 64% from public schools. Inclusion criteria were: 6-17 years of age, Spanish as primary language, an IQ ≥80 on Test of Non-Verbal Intelligence-2, and scored <19 on Children's Depression Inventory. Children with history of neurologic/psychiatric disorders were excluded. Participants completed the SVF Animal and Fruit category tests and four scores were obtained for each test: mean cluster size, number of clusters, number of switches, and total score.
Results: Multiple linear regression (MLR) models included child's age and sex, and PMEL as independent variables, and the four scores as dependent variables. MLRs for Animal total score (R^2=.177), number of clusters (R^2=.201), and number of switches (R^2=.182) were significant (p's<.001). Only age was associated with total score (β=.407), number of clusters (β=.416), and number of switches (β=.388). Regarding Fruit, MLRs for total score (R^2=.353), number of clusters (R^2=.222), and number of switches (R^2=.210) were significant (p's<.001). Age was associated with total score (β=.527), number of clusters (β=.461), and number of switches (β=.447), and sex with total score (β=-.211).
Conclusions: Children increased their total scores, number of clusters and switches in Animal and Fruit SVF tests as they grow older, and girls achieved higher total Fruit scores. Better performance according to age may reflect the development of executive functioning required to successfully complete the task. Differences by sex depended on the category used and may result from gender stereotypes and/or sociocultural influences. The influence of sex was smaller compared to age.
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N.A. MEDINA, L. OLABARRIETA-LANDA, E. VERGARA MORAGUES, D. RIVERA, J. FOLLECO & J.C. ARANGO-LASPRILLA. Age was associated with clustering and switching strategies during phonological verbal fluency tests in children from Bogota, Colombia.
Objective: To determine whether child's age and sex, and parents' mean educational levels (PMELs) are associated with phonological verbal fluency (PVF) total score, number of clusters and switches, and cluster size.
Participants and Methods: One-hundred children from Bogota (Colombia) participated in the study. 62% were girls, the mean age was 11.82±2.68 and the PMELs was 10.91±3.15 years. Inclusion criteria were: 6-17 years of age, Spanish as primary language, an IQ ≥80 on Test of Non-Verbal Intelligence-2, and scored <19 on Children's Depression Inventory. Children with history of neurologic/psychiatric disorders were excluded. Participants completed the PVF tests (F,A,S) and mean cluster size, number of clusters, number of switches, and total score were calculated.
Results: Multiple linear regression (MLR) models included child's age and sex, and PMELs as independent variables, and the four scores as dependent variables. MLRs for F total score (R^2=.313), and number of clusters (R^2=.239) and switches (R^2=.249) were significant (p's<.001). Age was associated with total score (β=.528), and number of clusters (β=.492) and switches (β=.505). MLRs for A total score (R^2=.279), and number of clusters (R^2=.192) and switches (R^2=.186) were significant (p's<.001). Age was associated with total score (β=.536), and number of clusters (β=.399) and switches (β=.398). MLRs for S total score (R^2=.144), and number of clusters (R^2=.145) and switches (R^2=.148) were significant (p's<.01). Age was associated with total score (β=.402), and number of clusters (β=.399) and switches (β=.402).
Conclusions: Children increased their total scores, number of clustering and switching strategies as they grow older. PMELs was not associated with PVF performance, although it has been related to child cognitive development. The fact that PMELs in this sample was of 10 years of education may explain this result. Sex was not associated with PVF performance, in line with prior studies of PVF tests in children.
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N. MOSS, S. ERICKSON, R. RIEGER, R. OHLS & J. LOWE. Bilingualism and Executive Functioning in Children Born Very Low Birth Weight and Normal Birth Weight.
Objective: Research has documented differences between monolingual and bilingual children, showing a bilingual advantage on executive functioning (EF) tasks. Bilingual children develop inhibitory control earlier than monolingual children. There are no studies examining the differences in EF between monolingual and bilingual children born very low birth weight (VLBW). Children born VLBW are at greater risk for difficulties with inhibitory control and attention.
Participants and Methods: Bilingualism was assessed by parent self-report and observation of languages spoken during a 5-minute play interaction between mother and child. Bilingual children were compared to monolingual children at 3-4 years (T1, bilingual n=44, monolingual n=49) and 5-7 years (T2, bilingual n=29, monolingual n=49). EF abilities were measured including inhibition (Bear Dragon [T1], Gift Delay [T1, T2]), working memory (Memory for Location 2 [T1], WJ-III Memory for Words [T1, T2]), and switching and processing speed (Color Form [T2], and DCCS [T2]).
Results: Parental report of bilingualism was not predictive of observed bilingualism at 3-4 years although it was at 5-7 years (p=.018). There was no difference between the language groups on EF tasks at 3-4 years. At 5-7 years the bilingual group showed greater inhibitory control on the Gift Delay (p=.033). However, the monolingual group performed better on the Color Form (p=.049).

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Conclusions: Our data suggest that at the preschool age, differences in EF between bilingual and monolingual groups have not emerged, but by school age, group differences are observed on measures of inhibitory control and switching/processing speed. Results also highlight the importance of using multiple forms of assessing bilingualism (e.g., self-report & observation), as there are varying degrees of bilingualism. Examining developmental differences between monolingual and bilingual children born VLBW provides a broader understanding of the development of early EF abilities in children at greater risk for developmental deficits.

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L. OLABARRIETA-LANDA, I. BENITO SÁNCHEZ, D. RAMOS USUGA & J.C. ARANGO-LASPRILLA. Does multiple language knowledge improve verbal fluency test performance?

Objective: To compare performance on letter, semantic, and verb fluency tests (FT) among monolingual, bilingual, trilingual, or multilingual (knowledge of 4 languages) participants.

Participants and Methods: 300 adults from Spain participated in the study. Inclusion criteria were 18-85 years of age, completed primary school, a score of ≥27 on the Mini Mental Examination Estate, a score of ≤4 on Patient Health Questionnaire–9. 62% of the sample were women with mean age of 49.69 and mean education of 1 3.12. 24% of the sample (n=72) were monolingual, 48.3% bilingual (n=145), 17% trilingual (n=51), and 10.7% multilingual (n=32). All participants completed the letter (M, R, P), semantic (Animals, Fruits, Professions) and verb FT in Spanish.

Results: Multivariate analyses of variance revealed significant differences between groups in age (p<.001) and education (p<.001), such that monolingual and bilingual groups were older and less educated than trilingual and multilingual groups (p's<.001). Analysis of covariances (ANCOVAs) controlling for age and education did not show significant differences among groups in letters, Fruits, or Professions. However, ANCOVA revealed significant differences in Animals (p<.009), such that bilingual group scored lower compared to multilingual group (p<.005). ANCOVA revealed significant differences in verb FT (p<.001), such that monolingual and bilingual groups achieved lower scores compared to trilingual and multilingual groups (p's<.01).

Conclusions: Multilingual participants scored higher than bilinguals on Animals, while trilingual and multilingual participants achieved higher scores than monolingual and bilinguals on verb FT. Verb FT seems to be more complex than letter and semantic FT, maybe because generating verbs is cognitively more demanding than substantives (commonly generated during letter and semantic VT), and it requires deeper knowledge of the language.

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L. OLABARRIETA-LANDA, W. RODRÍGUEZ IRIZARRY & J.C. ARANGO-LASPRILLA. Language influence on verbal fluency performance in Puerto Rican bilinguals.

Objective: To compare performance on phonological, semantic, and action verbal fluency tasks (VFT) when they are completed in English or Spanish by Puerto Ricans bilinguals.

Participants and Methods: 51 healthy adults from Puerto Rico participated in the study. Inclusion criteria were 18-60 years of age, completed primary school, a score of ≥27 on the Mini-Mental State Examination, a score of ≤4 on Patient Health Questionnaire–9, and be fluent speakers of English and Spanish. Fifty-two percent of the sample were women, with a mean age of 31.06±12.01 and mean years of education of 16.63±4.53. All participants completed the letter (F, A, S, M, R, P, E, B), category (Animals, Fruits, Professions), and action/verb VFT. The order of language of test completion was counterbalanced.

Results: Student-t revealed significant differences between languages (p's<.05). Participants achieved higher scores in letter (A, M, R, P, and E), category (Animals, and Occupations) and action/verb VFT when they were completed in Spanish vs. English (p's>.05). No differences were found on letters F, S, and B or Fruits category VFTs.

Conclusions: Higher VFT scores were found when bilingual individuals were tested in Spanish vs. English on most VFTs. Further study into the factors that may explain these differences (e.g., mother tongue, language-specific usages, culture influences in performance) is warranted.

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W. RODRÍGUEZ IRIZARRY, L. OLABARRIETA-LANDA & J.C. ARANGO-LASPRILLA. Letter, Category and Verb Fluency Test in a Group of Monolinguals and Bilinguals from Puerto Rico.

Objective: To compare performance on verbal fluency tasks (VFT) between monolinguals and bilinguals from Puerto Rico.

Participants and Methods: 56 Spanish monolinguals, and 51 bilinguals from Puerto Rico participated in the study. Fifty-eight percent were women with a mean age of 35.10±13.98, and mean years of education 1of 5.66±4.18. All participants completed the letter (letters F, A, S, M, R, P, E, and B), category (Animals, Fruits, and Professions) and verb VFT. Monolinguals were tested in Spanish and bilinguals in English and Spanish. From bilinguals, the order of languages was counterbalanced. Performance on Spanish language tests was compared.

Results: T-tests showed significant differences in age (t=2.957, p<.05) and education (t=-2.300, p<.05), such that monolinguals were older and less educated than bilinguals. Multivariate Analysis of Covariance (MANCOVA) controlling for age and education did not show significant differences between monolingual and bilingual groups on Spanish language VFT performance on all tests as a group (F=.937, p>.05).

Conclusions: Results showed that Puerto Rican monolinguals and bilinguals performed similarly on VFTs. It may be that self-identified monolingual Spanish speakers are really "bilingual" because of their exposure to English language in social and educational settings in Puerto Rico. Further research with larger samples is warranted.

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L. OLABARRIETA-LANDA, D. RIVERA, R. NANDI, S. GOPALKRISHNAN, S. RAO, J. EVANS & J.C. ARANGO-LASPRILLA. Phonological and Semantic Verbal Fluency Tests: Normative Data for Bengali Speakers.

Objective: To develop age, education and gender-adjusted norms for the Bengali version of the Phonological and Semantic Verbal Fluency Test (VFT)

Participants and Methods: The sample consisted of 310 healthy adults from Kolkata, India. Inclusion criteria were 40-90 years of age, a score of >25 on the Mini Mental State Examination, and a score of ≤8 on Hospital Anxiety and Depression Scale. Participants had no self-reported history of neurological, psychiatric disorders, or alcohol and substance abuse. 51% were women, the average age was 59.44, and the average educational level was 11.87 years. Participants completed the Phonological (total score=PA+KA+MA) and Semantic (Animals) VFTs.

Results: The multiple linear regression models (MLRM) included age, age^2, levels of education, gender, and all two-way interactions between these variables as predictors and the score of each of the VFTs as dependent variables. The final MLRM explained 55.4% of the Phonological total score, and 26% of the Animals category. Levels of education showed significant effect on Phonological total score, and Animals (p's< .001). Age also showed significant effect on Animals (b=-.068; p=.001). To generate adjusted norms, the predictive value and the residual value were obtained, the residual value was standardized, and percentiles were calculated for each VFT, taking into account significant predictors.

Conclusions: State-of-the-art approaches using MLRMs and residual values have been used to allow a more accurate calculation of the normative data for phonological and semantic VFT. These norms provide reference values to those who work in the neuropsychological evaluation of the Bengali adult population.
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J. OROBIO, K.P. RAGHUBAR, M.D. RIS, S. TORRES, H.H. STANCEL & L.S. KAHALLEY. The Complexities of Language of Assessment in Longitudinal Follow-Up of Hispanic Pediatric Brain Tumor Patients: A Case Study.
Objective: Hispanics and Latinos make up approximately 18 percent of the total U.S. population and are the second largest racial or ethnic group in the country. This case report highlights the challenges in the longitudinal neurocognitive evaluation of Hispanic pediatric patients despite the availability of measures for Spanish-language administration.
Participants and Methods: The patient was diagnosed with ventricular ependymoma with anaplastic features at 2 years of age, and he underwent 3 craniotomies resulting in gross total resection and 10 weeks of proton beam radiotherapy. The patient completed neurocognitive evaluations at 4 time points (ages 5-9 years). At the first assessment, the patient's dominant language was determined to be Spanish based on an algorithm including primary language used for (1) communication in the home, (2) watching television, and (3) learning in the classroom. At the fourth assessment, the patient's dominant language was determined to be English.
Results: Scores over time revealed stable global intelligence regardless of language of test administration. Declines were observed in working memory, fine motor speed and dexterity, and visual-motor integration over time. He demonstrated particular weakness in executive functioning, though there was variability in the measures used over time.
Conclusions: There are unique challenges to the longitudinal neurocognitive surveillance of pediatric Hispanic patients from families whose primary language is Spanish, including changes in a patient's language exposure, preference, and dominance over time as well as the availability of psychometrically sound assessment tools for Spanish-speaking children living in the U.S. This case study illustrates complications encountered when attempting to monitor neurocognitive development and to draw inferences from neurocognitive data collected longitudinally in a medically complex population with significant neurocognitive risk.
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C.R. PAGAN, A. GAVARRETE OLVERA, S. GIDANIAN & J. RAZANI. Cultural Factors as Predictors of Intelligence Test Performance in Ethnically Diverse Groups.
Objective: The purpose of this study was to examine IQ scores in English-fluent ethnically diverse (ED) and Caucasian groups and to identify cultural factors that best predict test performance in the ED group.
Participants and Methods: 297 individuals (Hispanic: n = 52; Asian: n = 62; Middle-Eastern: n = 96; Caucasian: n = 87) recruited from the greater Los Angeles area participated. The Wechsler Abbreviated Scale of Intelligence (WASI) was administered as the measure of intelligence and the following scores were included in the analysis: Full Scale Intelligence Quotient (FSIQ), Verbal Intelligence Quotient (VIQ) and Performance Intelligence Quotient (PIQ). Demographic information was collected, including years of education in the U.S. and years of residence in the U.S. was also gathered. The Acculturation Rating Scale for Mexican Americans (ARSMA) was adapted and administered to the ED group.
Results: ANCOVAs were performed, using education as a covariate, to evaluate group differences in FSIQ, VIQ and PIQ scores. Significant group differences across all IQ scores based on ethnicity were found. Specifically, the Caucasian group significantly outperformed each ED group. Additionally, a paired-samples t-test revealed significantly higher PIQ scores relative to VIQ scores for the ED group, $t(200) = -7.86$, $p < .001$. A stepwise regression was performed to determine which cultural factor best predicted the VIQ-PIQ discrepancy. The acculturation scale was the best and sole predictor of the VIQ-PIQ discrepancy, $F(1, 121) = 17.158$, $p < .001$, accounting for 12% of the variability.
Conclusions: The results revealed that Caucasians outperformed the ED group on the WASI Verbal IQ and that acculturation accounted for a large portion of the VIQ-PIQ discrepancy. These findings suggest that the VIQ is measuring more than just language fluency in these English-fluent ED participants, but there are other acculturation factors that should be considered.
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T. PRINCE. Neuropsychological Test Scores of Native English Speaker Vs. Non-Native English Speaker: A Meta-Analysis.
Objective: Neuropsychologists often have to ask themselves how to best evaluate and understand the neuropsychological function of 'linguistic minorities.' This question is critical as the use of a language other than English at home is becoming more prevalent - with an increase of 148 percent between 1980 and 2009. A number of researchers have completed research looking at differences in neuropsychological test scores between native English speakers and non-native English speakers; however, the results vary immensely for both verbal and non-verbal tasks. A meta-analysis was, therefore, undertaken to examine neuropsychological assessment score differences between Native-English speakers (NES) and non-Native English speakers (non-NES) across five cognitive domains.
Participants and Methods: I systematically searched multiple online databases for studies that compared neuropsychological assessment scores between NES and non-NES. Potential studies were screened using detailed inclusion/exclusion criteria. Effects sizes were calculated using a random-effects model and ninety-five percent confidence intervals computed to determine statistical significance.
Results: Twelve studies were selected to analyze the average difference of test scores (N= 66), on 36 neuropsychological tests, across five domains of cognitive functioning, between a NES population and a non-NES population. The mean effect size for the sample of studies under the random effects model was small and statistically significant. When considering the cognitive domain assessed by the assessment tool, larger effect sizes were noted for language assessments.
Conclusions: When comparing scores on neuropsychological test between non-NES and NES, NES generally obtained higher scores than non-NES. The findings are discussed in terms of important moderator variables and potential limitations.
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S. RASKIN, L. CADAVID & S. LYLES. Effects of language and culture on prospective memory.
Objective: Prospective memory (PM) is the ability to remember to complete intentions and is important to daily life. While other aspects of memory have been demonstrated to be influenced by culture, to our knowledge, there have been no investigations of the effect of culture on PM.
Participants and Methods: We included individuals from the Caribbean and those of European descent, all living in the United States (US). There were three groups: a group from the Caribbean, a group whose parents had immigrated from the Caribbean but who had been born in the United States, a group of European descent from the US. Groups

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were matched for age and years of education. PM was measured using the Memory for Intentions Test (MIST). To measure future thought, participants imagined events that could happen in the next year and that were autobiographical in nature. Participants were instructed to 'Imagine a future event in the next month. A specific event that happens on one particular day. Please describe it with as much detail as possible; what you do and feel; who you are with, where it happens and how it happens.' Future event productions were scored for the number of internal (central to the imagined event) and external details (superfluous to the main event). Measures were given in English or Spanish.
Results: There was a significant effect of group on the 24-hour measure, event-based, and time-based performance tasks. Those who had lived their childhoods in the Caribbean demonstrated superior performance on the 24-hour item. There was no difference between the groups on the event-based tasks; however those born in the Caribbean performed significantly lower on the time-based tasks than those born in the U.S. Paired comparisons revealed that those who were born in the U.S. to parents from the Caribbean performed no differently than those born in the U.S. of European descent on any measure.
Conclusions: There is preliminary evidence that culture plays a role in the use and performance skills of individuals on tasks of prospective memory.
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L.D. ROSENSTEIN & A. CECIL. Reliable Digit Span: Questionable Validity Among Spanish-Speaking Patients from Latin America.
Objective: Neuropsychologists must apply the correct normative data to patients according to important demographics such as age, education, language, and country of origin. When interpreting test data, neuropsychologists must also take steps to ensure that patients are adequately engaged in the testing process in order to validly interpret those data. To that end, several embedded and stand-alone measures of effort have been developed; however, some of those measures may not be appropriate depending on patient demographics. The present data underline the need to consider this with respect to a popular embedded measure of effort, Reliable Digit Span (RDS).
Participants and Methods: Participants included all monolingual Spanish-speaking patients seen for neuropsychological evaluation by the author from July 2017 through April 2018. A battery of tests was administered in Spanish by a technician certified as an interpreter. The final sample included 26 individuals from Mexico, Cuba, Guatemala, El Salvador, Nicaragua, Chile, Argentina, and Venezuela. The average age was 64 years (range 31-80) with average education of 7.4 years (range 0 to 20). None of the patients was involved in litigation or had other known external incentive to perform poorly.
Results: The modal traditional RDS was 5 (mean=5.4, SD = 1.1), which is below most established cut-off scores even for older adults. Education and age were not predictive of RDS. Forced choice recognition performances on two measures were above chance for the group (HVLT-R Recognition Mean = 80%; Rey Osterrieth Recognition Mean = 75%) with only one person scoring below chance.
Conclusions: The RDS may not be a good measure of effort for individuals from parts of Latin America. This may relate to cultural factors given the lower normative scores for Mexican WAIS-IV Digit Span (for a Scale Score of 10, Raw Score = 25-26 for individuals in the 20-24:11-year-old age range) compared to U.S. Digit Span (Raw Score= 28-29), and Digit Span in Spain (Raw Score=27-28).
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T.M. SCOTT, H. GOUSE, G. SPIES & R.N. ROBBINS. HIV+ South African Women Perform Similarly on the Hopkins Verbal Learning Test-Revised Administered in a Home or Acquired Language.
Objective: Prior research has shown that an adapted Hopkins Verbal Learning Test-Revised (HVLT-R) given to healthy multilingual South Africans performs similarly between home (isiXhosa) and acquired (English) language administrations. The present study examined HVLT-R test performance between these home or acquired languages among HIV+ multilingual South African women.
Participants and Methods: An adapted HVLT-R was administered to 114 HIV+ South African women whose home language was isiXhosa in either English (n=64) or isiXhosa (n=50). Test language groups did not differ by HIV+ disease burden group (i.e., high burden: CD4<200 or viral load>100k; p>.05). HVLT-R outcome scores examined included Total and Delayed Recall and Percent Retained (i.e., Delayed Recall/higher score of Trials 2 or 3).
Results: English examinees were significantly (p's<.01) younger (M=31.3 years, [SD=6.2]) and more educated (M=10.6 years, [SD=1.1]) than isiXhosa-language examinees (M=35.7 years [SD=6.5], M=9.4 years [SD=2.1], respectively). Bivariate analyses indicated that more education was associated with better test performance (most p's<.05), but age was not associated with test performance (p's>.05). Multivariate analysis of covariance (MANCOVA) adjusted for education revealed no significant differences between language groups on HVLT-R performance indices (p>.05).
Conclusions: Performance on this adapted HVLT-R appears similar across language administrations. Thus, giving this test in either English or isiXhosa may be appropriate in HIV+ isiXhosa as a first language women. Future research should consider replicating these findings with men and additional HVLT outcome scores.
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Neuroimaging

J. CHENG, D. LITTLE, L. STEELE, T. HEEREN, R. KILLIANY, K. SULLIVAN & B. KOO. Preliminary Evaluation of Diffusion Imaging Features for Classifying Veterans with Gulf War Illness.
Objective: We assessed brain diffusion MRI data from the first 32 veterans enrolled in the ongoing Gulf War Illness (GWI) Consortium study to disentangle different components of intra-voxel diffusion to assess brain imaging features specific to GWI.
Participants and Methods: MRI data from 32 GW veterans (11 GWI cases without mild TBI, 12 GWI cases with mTBI during the war, 9 GW veteran controls) were evaluated. Diffusion imaging were collected based on 124 directions with multiple b-vals and reconstructed by tensor (DTI) and multicompartmental modeling. Major white matter (WM) fibers were defined based on probabilistic tracking and applied sampling diffusion measures. Extracted tract measures were applied for testing group differences on the following pairs: 1) all_GWI cases vs controls, 2) GWI with mTBI vs controls, 3) GWI without mTBI vs controls, 4) GWI with mTBI vs GWI without mTBI. We applied multi-layered decision forest maps on the diffusion measures. Each classifier performance was tested based on a leave one out cross validation.
Results: DTI measures showed either strengthened (higher FA, lower RD or lower MD) or opposite patterns in major WM tracts in GWI cases. Multicompartmental diffusion in those fibers consistently showed signs of reduced WM integrity (lowered ICVF and enhanced OD). In the subgroup analyses, GWI cases with mTBI showed more pronounced WM alterations than GWI cases without mTBI. Overall, the highest classification performance for identifying GWI cases was confirmed in the multicompartmental model (accuracy:88%) followed by DTI (62%).
Conclusions: Multi-compartmental diffusion modeling results confirmed that the complex DTI patterns were consistent with degenerative patterns and appear to hold promise for differentiating GWI cases

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from controls. Combining machine-learning technology with multi-compartmental diffusion measures may allow for better classification of GWI cases and may also provide a better understanding of the complex pathobiology and potential subgroupings of GWI.
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H.E. DARK, N. HARNETT, A. KNIGHT & D. KNIGHT. Hippocampal and amygdala volume vary with post-traumatic stress symptoms.
Objective: Post-traumatic stress disorder (PTSD) is characterized by a combination of re-experiencing, avoidance, and hyperarousal associated with stimuli linked to a traumatic event. Smaller hippocampal and amygdala volumes have been linked to greater PTSD symptom expression and severity. However, few studies have assessed amygdala and hippocampal volume of patients recently exposed to a traumatic event to determine relationships with symptom expression over time. The present study examined the relationship between acutely assessed brain volume and post-traumatic stress symptoms evaluated at ≤1, 3, and 6 months post trauma to determine whether brain volume was associated with symptom expression.
Participants and Methods: 40 participants (Age: M=27.0; SD=7.4) were recruited for the present study, 20 exposed to a traumatic event (TE), and 20 healthy controls (HC). TE participants were recruited from UAB Hospital within 30 days of trauma exposure. All participants completed a T1 weighted MRI scan on a 3T Allegra scanner. A volumetric analysis was performed on the amygdala and hippocampus. The Posttraumatic Diagnostic Scale (PDS) was used to assess PTSD symptoms at ≤1, 3, and 6 months after the event. Bivariate correlations and an ANCOVA were used to examine the relationship between post-traumatic stress symptoms and brain volume.
Results: Within the TE group, hippocampal volume varied negatively with re-experiencing (p=.04) and avoidance (p=.04) symptoms at 6 months while amygdala volume varied negatively with re-experiencing (p=.02) symptoms at 6 months.
Conclusions: Findings from the present study suggest acutely assessed smaller hippocampal and amygdala volume is associated with the expression of PTSD symptoms at 6 months after a traumatic event.
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C. DION, M. AMIN, L.P. HIZEL, C. HARDCASTLE, S.J. CROWLEY, M.E. WIGGINS, R. DAVIS, J.J. TANNER, T. MARECI & C. PRICE. Implications of Frontal and Parietal Structural Connectomics in Total Completion Time of the Digital Clock Drawing Test.
Objective: Longer total completion time (TCT) on the digital clock drawing test (dCDT) negatively associates with standardized measures of frontal-subcortical and frontal-parietal function (processing speed, working memory) in older adults. Less is known regarding the interplay between TCT and structural white matter connectivity. We examined the association of TCT with structural integrity of frontal and parietal regions via connectome metrics.
Participants and Methods: Non-demented older adults meeting criteria for a separate federal investigation completed neuropsychological assessment, digital clock drawing, and 3T brain MRI. Digital variables were scored using validated software and manually corrected by a reliable rater. Fiber tracking was calculated using in-house software. Connectome metrics of interest included local clustering coefficient, degree, and node strength for bilateral frontal and parietal gray matter regions of interest (ROIs). Lateral occipital cortex served as a control region. Covariates included age, a cognitive reserve composite (education, word reading, and vocabulary), and total intracranial volume.
Results: 125 participants met study criteria (mean age=68.82, SD=6.29, 56% female). Separate hierarchical regressions showed increased local clustering coefficients for greater TCT for the right superior parietal (b=.257, p=.003), left inferior parietal (b=.229, p=.01), right rostral middle frontal (b=.231, p=.01), and right superior frontal (b=.185, p=.036) ROIs. There were no significant associations with degree and node strength. Lateral occipital connectome metrics did not associate with TCT.
Conclusions: For non-demented older adults, slower TCT associated with greater local clustering of nodes within parietal and frontal regions. Fronto-parietal local clustering may signify compensatory strategies or inefficiency of structural connectivity. Future research should investigate TCT and connectome profiles in brain regions and relations with cognition.
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K.A. DORSMAN, A.M. STAFFARONI, J. BROWN, S.M. WALTERS, A. WOLF, Y. COBIGO, J. KRAMER & K.B. CASALETTO. Get Moving! Higher Levels of Self-Reported Physical Activity Over Time Are Associated with Functional Connectivity.
Objective: Physical activity is an attractive modifiable factor reported to impact cognition and brain structure as we age. However, the mechanisms underlying this relationship remain less clear. Functional connectivity (FC), measured by task-free functional MRI (tf-fMRI) is a dynamic marker of the brain's network functioning and may be sensitive marker of the brain's response to exercise. We aimed to explore the relation between self-reported levels of physical activity and FC in clinically normal older adults.
Participants and Methods: 185 clinically normal, longitudinally-followed older adults completed the Physical Activity Scale for the Elderly (PASE) questionnaire and tf-fMRI at each study visit [mean 1.5 visits (range:1-3)]. The longitudinal relationship between PASE and FC (both in SD units) was explored using linear mixed models. We studied FC of the DMN, frontal-parietal, frontal-subcortical, and intra-subcortical networks given their known disruption in aging. To adjust for cerebrovascular disease, we covaried for DTI fractional anisotropy of cortico-subcortical tracts, and vascular risk factors (BMI, heart rate, systolic pressure), as well as age and sex.
Results: Within-subject changes in physical activity positively tracked with executive-subcortical inter-network FC changes (β=.24, p<.03) and intra-subcortical FC (β=.35, p< .03), but between subject effects were not significant (β=-.07, p=.36) and (β=-.10, p=.36) respectively. In contrast, no longitudinal associations were observed between PASE and DMN (β=.04, p=.68) or fronto-parietal (β=.15, p=.14) networks.
Conclusions: Our findings suggest that within-person increases in exercise are specifically associated with greater frontal-subcortical and subcortical-subcortical FC. Increased FC in these networks may explain the beneficial effects of exercise interventions in aging. This effect appears to be independent of cerebrovascular disease, possibly driven by a neural response to exercise.
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S. DUTT, Y. LI & D.A. NATION. Brainstem Substructure Volumes Predict Progression to Dementia in Cognitively Normal Older Adults.
Objective: The present study quantified volumes of the brainstem and its substructures across the spectrum of neurocognitive decline to determine group differences in brainstem volumes and whether brainstem volumetrics can predict progression to future dementia.
Participants and Methods: Alzheimer's Disease Neuroimaging Initiative (ADNI) participants (N = 1677) underwent baseline MRI scanning with clinical follow-up (6-120 months). T1-weighted structural images were processed with voxel-based morphometry (VBM) to obtain whole brainstem and substructure volumes. One-way analyses of covariance tested group differences in neuroimaging variables, and proportional hazards

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survival analyses assessed risk for progression to dementia. Voxel-wise two sample t-tests assessed regional volumetric differences between groups.
Results: We observed smaller brainstem and midbrain volumes in AD and MCI patients relative to CN, with no difference in pons volumes. Among CN individuals, those who progressed to dementia exhibited smaller baseline brainstem and midbrain volumes than those who did not progress, with smaller baseline midbrain volume conveying decreased risk of progression to AD. Brainstem-masked VBM analyses demonstrated reduced volume of the posterior rostral pons, overlapping the locus coeruleus, in CN individuals who progressed to dementia compared to those who never progressed to dementia.
Conclusions: Findings demonstrate reduced brainstem volume in MCI and AD compared to CN, and implicate whole brainstem and midbrain volumes in risk for future dementia in preclinical populations. Brainstem-masked VBM analyses detected smaller volumes in regions with anatomical correspondence to the locus coeruleus in CN individuals who eventually progress to dementia but do not yet exhibit detectable cognitive impairment. Findings are consistent with neuropathological studies indicating the locus coeruleus as the first site of AD-related pathology. Brainstem volumes may represent a useful biomarker of dementia risk in asymptomatic individuals.
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E.E. ELINE, A. KAPLAN & K. OSIPOWICZ. The White Matter Correlates of Emotional Intelligence and Abstract Reasoning.
Objective: The relationship between abstract reasoning (AR) and emotional intelligence (EI) is poorly understood. Furthermore, the functional-anatomical correlates of the relationship between these two constructs have not been established. Here, we test the hypothesis that there are unique anatomical networks associated with the expression of AR and EI; specifically, that limbic fibers will be preferentially associated with EI and fronto-parietal longitudinal association fibers will be associated with AR.
Participants and Methods: 335 healthy adults underwent testing of Emotional Intelligence (MSCEIT), abstract reasoning (RPM), and DTI. DIffusion tensor connectometry was utilized to test correlations between white matter tract organization and each: Emotion Utilization and Abstract Reasoning, and the interaction of both.
Results: DTI connectometry results demonstrate widespread white matter connectivity associated with both: EI and AR, with some differential effects, specifically in the occipitofrontal fasciculus, cingulum, and the inferior longitudinal bundle.
Conclusions: While the interaction between AR and EI remains unclear, our findings demonstrate that there is some anatomical overlap between the two, but that there are anatomically distinct substrates associated with each. These findings suggest that there are neuroanatomical correlates underlying interpersonal behaviors.
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J. OTTINO-GONZÁLEZ, M. JURADO, B. SEGURA, I. GARCÍA-GARCÍA, X. PRATS SOTERAS, I. MATÉS, S. LUIS-RUIZ, X. CALDÚ, E. TOR, M. SENDER-PALACIOS, C. SANCHEZ-GARRÉ, N. MIRÓ, T. FONT & M. GAROLERA. Differences in brain's structural networks linked to body-weight status.
Objective: Structural network analysis allows the study of the morphological covariance between neighboring cortical areas. Obesity has been linked to changes in brain structure. The current study aims to compare the integrity of structural networks in normal-weight and obese participants.
Participants and Methods: Thirty-nine lean (mean age 29.18 ± 7.44, 56% female, BMI range 17.16 – 24.99 kg/m^2) and 40 obese (mean age 31.50 ± 8.45, 60% female, BMI range 30.10 – 49.69 kg/m^2) adults underwent an MRI acquisition (3T Siemens). None of the participants presented medical, neurological nor psychiatric comorbidities. Cortical surface was reconstructed using FreeSurfer software (v.6.0). A factor reduction analysis was carried out in IBM SPSS Statistics (v.23.0) with the mean thickness (mm^2) of automatically parceled cortical areas (Desikan Atlas, 32 regions per hemisphere). The resulting factors were compared between groups controlling the effects of age and sex.
Results: Groups did not differ for any sociodemographic variable. Factor reduction returned 14 components. Obese subjects showed greater cortical thinning ($Mean_{Obese}$= -0.31 ± 0.92) when compared to normal-weight participants ($Mean_{Lean}$= 0.31 ± 0.96) in a network formed by the bilateral rostral and caudal cingulate gyrus, the left fusiform gyrus, and the right posterior cingulate gyrus ($F_{1,76}$= 8.55, p= 0.005).
Conclusions: The excess of adiposity is related to gray matter reductions in paralimbic regions known for regulating emotional responses and supporting autobiographical memory and decision-making. These processes are crucial for supervising eating behavior.
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S. GLAZER, H.F. GUZMAN, P. HAGERDORN, H.A. ALEKSONIS, R. WIER, R. OLSHEFSKI, K. VANNATTA & K.R. HOSKINSON. Depression in Pediatric Brain Tumor Survivors: An Analysis of White Matter Integrity of the Uncinate Fasciculus Using Diffusion Tensor Imaging.
Objective: Pediatric brain tumor survivors (PBTS) are at heightened risk for symptoms of depression after treatment. This risk may be due to diminished integrity of white matter (WM) tracts that support emotion regulation, including the uncinate fasciculus (UF), which connects the lateral orbitofrontal cortex with the anterior temporal lobes. These links remain underexplored in PBTS and are the focus of this pilot analysis.
Participants and Methods: Thirteen PBTS and nine healthy controls (HC) (ages 8-14) underwent diffusion tensor imaging to assess WM microstructure. Tractography (DSI Studio) quantified mean fractional anisotropy (FA) and apparent diffusion coefficient (ADC) in the UF. Children rated depressive symptoms on the Child Depression Inventory (CDI) and parents rated their child's emotional control on the Behavior Rating Inventory of Executive Function (BRIEF-EC).
Results: Relative to HC, PBTS had lower FA in the right UF, indicating reduced WM integrity ($t(20)$=2.52, p<.05). ADC also differed bilaterally by group, with PBTS showing higher ADC in the left ($t(20)$=-3.12, p<.01) and right ($t(20)$=-2.97, p<.01) UF, also reflecting reduced WM integrity. Groups did not differ in CDI scores or BRIEF-EC; both groups reported low levels of depressive symptoms, but parents in each group reported poor emotional control. Albeit with limited statistical power, linear hierarchical regression suggests that including ADC accounted for 6% additional variance in CDI, and including FA accounted for over 20% in BRIEF-EC.
Conclusions: PBTS remain at elevated risk for symptoms of depression, which may be partially due to the impact of the tumor and its treatment on the brain systems that support emotion regulation. Monitoring of these systems, awareness of the differential impact of treatment modalities, and screening for emotional distress may improve early identification of those needing intervention and thereby improve overall quality of life for survivors. Examination of other relevant WM tracts (e.g., cingulum) is also warranted.
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H.F. GUZMAN, S. GLAZER, P. HAGERDORN, H.A. ALEKSONIS, R. WIER, R. OLSHEFSKI, K. VANNATTA & K.R. HOSKINSON. Associations Among White Matter Integrity in the Inferior Longitudinal Fasciculus, Executive Function, and Processing Speed in Pediatric Brain Tumor Survivors.

Objective: Pediatric brain tumor survivors (PBTS) are at risk for deficits in executive function (EF) and processing speed, as well as reduced white matter (WM) integrity. The inferior longitudinal fasciculus (ILF) WM tract connects the temporal and occipital regions of the brain, and is thought to support EF, while WM integrity in general has been linked with processing speed. The impact of a tumor and its treatment on the integrity of the ILF and on processing speed may explain deficits in EF for PBTS. We examined relationships among ILF WM integrity, processing speed, and daily EF in PBTS.

Participants and Methods: Thirteen PBTS and 9 healthy controls (HC) completed diffusion tensor imaging to assess WM microstructure. Tractography via DSI Studio assessed apparent diffusion coefficient (ADC) of the ILF. Subjects also completed WISC-IV Processing Speed subtests, and parents rated their child's daily EF using the Behavior Rating Inventory of EF (BRIEF).

Results: Relative to HC, PBTS scored significantly lower on WISC-IV PSI (d =-1.17, p=.01). No group differences were found on the BRIEF; however, both the PBTS and HC groups were found to have lower daily EF relative to normative expectations. PBTS showed decreased WM integrity through increased ADC in the right ILF (d=1.11) and left ILF (d=.81), relative to HC. Although inclusion of ADC in hierarchical regression explained notable variance in EF, processing speed remained a more robust predictor.

Conclusions: PBTS are at risk for executive dysfunction and reduced processing speed, ostensibly due to the impact of the tumor itself and its treatment on brain systems that support such skills. Though limited by statistical power, results suggest that the integrity of WM tracts underlying relevant behaviors is important to consider. Future studies aiming to improve PBTS interventions and patient quality of life may consider treatment modality and neurotoxicity, as well as a thorough examination of EF and daily outcomes.

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P. HAGERDORN, S. GLAZER, H.F. GUZMAN, H.A. ALEKSONIS, R. WIER, R. OLSHEFSKI, K. VANNATTA & K.R. HOSKINSON. White matter integrity in the cingulum bundle and its association with executive functioning and peer acceptance in pediatric brain tumor survivors.

Objective: Pediatric brain tumor survivors (PBTS) are at increased risk for deficits in executive functioning (EF) and social adjustment. PBTS have also shown decreased white matter (WM) integrity both globally and in WM tracts with prefrontal projections. The cingulum bundle (CB) has implications in EF, but also has projections to the limbic system, which therefore could be influencing the social deficits commonly seen in PBTS. We sought to evaluate the relationships among WM integrity in the CB, EF, and peer acceptance.

Participants and Methods: 13 PBTS (ages 8-14) and 10 healthy controls (HC) were matched for age and sex. Participants completed a DTI scan, and tractography quantified WM integrity in the CB. Lesser fractional anisotropy (FA) and greater apparent diffusion coefficient (ADC) indicate compromised WM integrity. Classroom sociometric assessments yielded an average peer acceptance score and a home based assessment included three subtests of the Test of Everyday Attention for Children (TeaCh) assessing working memory and sustained attention (Code Transmission), switching (Creature Counting) and inhibition (Walk/Don't Walk).

Results: Right CB ADC was negatively associated with all three TeaCh subtests (rs = -.36 to -.55) and peer acceptance (r = -.37). Mean FA in the right CB was also associated with peer acceptance (r = .46). While data were hampered by limited statistical power due to small sample size, moderate to large effect sizes were noted, which consistently linked compromised WM integrity and poorer executive and social functioning.

Conclusions: Consistent with social neuroscience models, these results suggest that reduced WM integrity, particularly in the CB, may partially explain why PBTS demonstrate both cognitive and eventually social deficits. Future work should examine patterns of social behavior linking EF and social acceptance. These results could have implications in developing interventions for PBTS, and for the effective triaging of limited services to subgroups of survivors.

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K. IGWE, J. GUO, A. CHESEBRO, K. LAING, J.J. MANLY & A.M. BRICKMAN. Neurometabolic Correlates of White Matter Hyperintensities and Cognition in Middle-Aged Adults.

Objective: The analysis of neurometabolites in the hippocampus may provide insight into sources of age- and disease-related cognitive decline. The aim of this study was to characterize the relationship of hippocampal neurometabolite ratios with cognitive performance and white matter hyperintensity (WMH) volume using proton magnetic resonance spectroscopy (^{1}H MRS).

Participants and Methods: MRI scans and cognitive evaluations were collected in a sample of 64 racially/ethnically diverse middle-aged adult children of participants in a community-based aging study. Cognitive function was measured with tests from the NIH Toolbox Cognitive Battery. MRS scans were centered in the hippocampus. Neurometabolite ratios in the hippocampus were derived from the MRS scans and normalized with respect to Creatine (Cr) and WMH volumes were derived from the T2-weighted FLAIR MRI scans. A series of linear regressions was used to evaluate the relationship of neurometabolite ratios with WMH volume and cognitive measures controlling for age and gender.

Results: N-acetylaspartate (NAA) was positively associated at a trend level with performance on Picture Vocabulary (β=0.242, p=0.054), the Crystallized Cognition composite score (β=0.257, p=0.051), the List Sorting Working Memory Task (β=0.23, p = 0.068), and was negatively associated with temporal WMH volume (β=0.237, p = .0001). Myo-Inositol (mI) (β=0.068, p=0.046), Glutamate/Glutamine (Glx) (β=0.189, p=0.001) and NAA (β=0.264, p<0.001) were associated with temporal lobe WMH volume.

Conclusions: This study showed a relationship of metabolites that indicate compromised structural integrity, the presence of inflammation, and overall neuronal activity with WMH volume, a known marker of small vessel cerebrovascular disease. Markers of compromised neuronal structure were also associated with lower cognition.

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P. JONES, K. GICAS, A. JONES, V. KNERICH, D. LANG, W. PANENKA, W. SU, A. BARR, W. HONER & A. THORNTON. Associations Between Amygdala Nuclei Volumes and Social Network Size in Homeless and Marginally Housed Persons.

Objective: The amygdala is known as a brain region that plays a role in social behaviors. Although often thought of as a unitary structure, the amygdala is comprised of a group of nuclei, each with distinct functional connections. In homeless and marginally housed individuals, community morbidity rates and structural aspects of the environment may dysregulate social functioning in a multitude of ways. This study examined the neurobiological underpinnings of social connection by examining differential associations between amygdala nuclei volumes and social network size in a group of marginalized individuals.

Participants and Methods: Forty-four participants (N=44; mean age 42.6 years; 70% male) were included from an ongoing study of homeless and marginally housed adults in Vancouver, Canada. Social network size was assessed using the Arizona Social Support Interview Schedule.

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Amygdala volumes were measured by quantitative morphometric analysis of 3T T1-weighted MRI data using an automated protocol from FreeSurfer v6.0. The central amygdala nucleus (CeN) was selected as it is implicated in social and anxiety-related behaviors. The hippocampus and lateral amygdala nucleus (LaN) were included as control brain regions. Multiple linear regression analyses were conducted to investigate the relationship between amygdala nuclei volumes and social network size.
Results: Participants not part of a social network had significantly smaller amygdala volumes than those with ≥2 connections ($t(42)=2.21$, $p=.032$). After controlling for age, gender and intracranial volume, larger CeN volumes were significantly associated with larger network size ($\beta=.331$, $p=.036$), whereas the whole amygdala ($\beta=.273$, $p=.087$), LaN ($\beta=.152$, $p=.342$) and hippocampus ($\beta=.213$, $p=.178$) were not.
Conclusions: These findings corroborate previous conclusions that the amygdala is an important structure for social connection in humans, but raises the possibility that select nuclei are differentially related to social functioning.
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C.M. KAIVER, A. WALLACE, M.M. KANGISER, D. MULLIGAN, G. MESSMAN & K. LISDAHL. Binge Drinking Impacts Prefrontal Gyrification Index in Adolescents and Young Adults.
Objective: Binge drinking is associated with abnormalities in brain structure during neurodevelopment in adolescents and young adulthood, such as cortical thickness, cerebellar gray and white matter volumes, and total cerebral volume; however, research on how binge drinking affects cortical folding, or gyrification, remains unexplored. In this study we examined the association between binge drinking and gyrification in adolescents and young adults and whether gender moderated these findings.
Participants and Methods: 61 participants aged 16-26 (59% male) were included in this study. Past year total binge drinks and cannabis use were measured with the Timeline Followback. Local gyrification index (LGI) was measured in FreeSurfer. General linear regressions were used to determine if past year total binge drinks predicted LGI, controlling for past year cannabis use (multiple corrections conducted with Monte Carlo simulation at p=.05).
Results: Total past year binge drinks predicted significant clusters of increased LGI in the precentral gyrus (p=.04), middle temporal gyrus (p=.01), superior frontal gyrus (p<.01), precuneus (p<.01), and the cuneus (p<.01); gender did not moderate these findings.
Conclusions: Contradicting our hypothesis, increased past year binge drinking predicted greater LGI in the precentral gyrus, middle temporal gyrus, superior frontal gyrus, precuneus and cuneus. These findings could indicate reduced developmentally-appropriate cortical pruning, or alternatively, greater cortical complexity in moderate bingers. Brain-behavior relationships found weak correlations between slower Trail B performance and greater LGI in precuneus (r=.17) and superior frontal (r=.16) regions in the binge drinkers, providing potential support for the former interpretation. Prospective longitudinal studies are needed to assess the relationship between binge drinking and gyrification.
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N. KAPLAN, M.J. LEAVITT, J.B. MILLER & J.Z. K. CALDWELL. Quality Assessment of Freesurfer Segmentation Conducted on Clinical 3T MRI Scans.
Objective: Assess quality of Freesurfer 6.0 segmentation of MRI scans acquired for clinical purposes in a cohort of patients presenting for evaluation of memory complaints.
Participants and Methods: 837 patients (425 female; 83% Caucasian; 730 scanned prior to a magnet upgrade) who received a clinical 3T MRI as part of an evaluation of memory complaints from 2012-2017. Raw MRI data were segmented and images with poor contrast were reconstructed using non-uniformity intensity correction. Images were then visually assessed (NLK, MJL) for errors (pial boundary and gross segmentation errors and inaccurate white/grey matter identification). Images with minor segmentation errors were manually edited and underwent up to 4 additional reconstructions to improve segmentation quality.
Results: Of 837 scans in our sample, 54% were of adequate quality for research (29% after initial segmentation; 71% with corrections). The remaining 46% of images in our sample were discarded (20% after initial inaccurate segmentation due to severe motion in the original MRI scan as well as other imaging artifacts; 80% after edits). With respect to the magnet upgrade, 56% of pre-upgrade scans and 43% of post-upgrade scans were retained, a statistically significant difference in scan retention ($z = -2.446$; $p = .014$). Sex did not impact retention rates ($z = -1.454$; $p = .146$); however, older patients ($m=72$) were more likely to have scans discarded in comparison to younger patients ($m=68$) ($z = -5.965$; $p = .000$).
Conclusions: Many studies use clinically-obtained 3T brain MRI scans for research. In our sample, only 54% of clinical scans were of sufficient quality for research purposes while 46% were unsuitable despite additional editing and reconstruction. These results suggest that it is important to assess quality of segmentation when using clinically-obtained scans in research protocols.
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W. KILLGORE & L. NICKERSON. Vulnerability and Resistance to Sleep Deprivation are Associated with Measureable Differences in Brainstem Gray Matter.
Objective: It is well-established that there are consistent trait-like inter-individual differences in vulnerability/resistance to sleep deprivation (SD)—some individuals can sustain cognitive performance at high levels with very limited sleep, while others are virtually incapable of remaining awake and alert without sufficient sleep. Thus far, it has been difficult to identify biomarkers or stable behavioral traits that may confer this resistance capacity. Here, we used a novel multimodal neuroimaging data fusion technique to predict lapses in vigilance during an overnight sleep deprivation session.
Participants and Methods: Thirty-eight healthy adults (17 male, 21 female; Mean Age= 25.8, SD=5.6 years), completed neuroimaging scans at 3T, including structural MRI, diffusion tensor imaging (DTI), task-based functional magnetic resonance imaging (fMRI), resting state functional connectivity (rsFC). Later the same week, participants completed a 28-hour SD session that included the psychomotor vigilance task (PVT) every hour. A linked independent components analysis (LICA) was used to identify independent components in the data. A total of 8 independent components emerged, which were then regressed against the log of lapses (i.e., reaction times ≥ 500 msec).
Results: After controlling for age and gender, the LICA revealed a single component that was significantly predictive of more lapses throughout the night ($R^2=.23$, $p=.005$). This component was comprised almost exclusively of modulated gray matter volume within the posterior brainstem, corresponding to the region of the ascending reticular activating system (ARAS).
Conclusions: Individuals with greater gray matter volume within the ARAS demonstrated more attentional lapses during the overnight SD session, suggesting a possible effect of ineffective pruning and synaptic inefficiency in more vulnerable individuals. Moreover, the volume of this system may serve as a measurable biomarker of trait vulnerability or resistance to SD.
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J. LACOMBE-BARRIOS, F. DÉGEILH, M. DEHAES, R. EL-JALBOUT, T. LUU, C. LAPIERRE, S. DESCHÊNES & M. BEAUCHAMP. Non-Sedated Structural MRI in Young Children with TBI: Preliminary Feasibility Results.

Objective: Traumatic brain injury (TBI) is prevalent in children under 6 years and can result in intracranial lesions. Magnetic resonance imaging (MRI) is useful for the identification of such lesions, but intrinsically limited by motion artefact. Thus, research on the integrity of the developing brain after early TBI is limited to clinically available information. Familiarization protocols for conducting MRI in young children without sedation have been validated and could be applied to the study of early TBI. We sought to validate a familiarization and acquisition procedure for non-sedated MRI in children under the age of 6 years, with the goal of systematically assessing brain integrity after early TBI.

Participants and Methods: Participants with TBI and typically developing controls (n=15, M age=5.02 years, SD=1.07) attended a behavioral familiarization including a cartoon story, interaction with a toy MRI, and listening to MRI sounds. Children watched a movie during acquisition of T1, QSM, DTI, T2, and resting-state sequences (GE 3T). Qualitative questionnaires documented success prediction, enjoyment, and overall experience. T1 images were visually inspected for motion and artefacts. Image quality was estimated quantitatively during preprocessing (CAT12 toolbox, SPM12).

Results: All participants were attentive and compliant during familiarization and enjoyed the story. 71% completed the entire protocol. Time in the scanner varied between 15-41 minutes. 83% liked the experience "very much" and 50% were willing to do it again. 80% of the T1 images were rated as between "good-excellent" quality. All T1 images had excellent overall image quality estimated during preprocessing.

Conclusions: Children were receptive to the familiarization procedure and most were able to remain still in the MRI without sedation, for a considerable length of time. The findings are promising for further validation of the procedure and implementation in larger pediatric TBI research projects.

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C. LOISELLE, G. NGO, R. MCLEAN, V. D'SA & S. DEONI. Functional connectivity differences in young children with and without social concerns.

Objective: Research examining early functional connectivity in social development is limited. This study aimed to examine differences between neural connectivity among several brain regions in young children with and without social developmental concerns.

Participants and Methods: Participants included 41 typically developing children (26 male, 15 female), ages 6-24 months; divided into 2 groups (Concerns n=11; No concerns n=30). The Communication and Symbolic Behavior Scales Developmental Profile Infant-Toddler Checklist (CSBS) was used to measure social development and the Mullen Scales of Early Learning - Early Learning Composite (ELC) was used to assess cognitive development. Resting state functional images (rsfMRI) were acquired during natural sleep on a 3T Trio scanner within 1 month of developmental assessment. Comparison of the functional connectivity networks between the two groups were performed using F-tests controlling for age, gender, and cognitive development.

Results: Of the 41 children, 11 (27%) screened positive for one or more concerns on the CSBS. Significant differences between groups in age (p=0.43), ELC (p=0.04), and CSBS Total Score (p<0.01) were noted. There was a moderate positive correlation between ELC and CSBS Total Score (r=0.40). RsfMRI results revealed several brain regions with increased connectivity in children with concerns (amygdala and cerebellum, dorsal striatum and parahippocampal gyrus, and frontal orbital cortex and brain stem) compared to children without concerns.

Conclusions: Preliminary results suggest that early differences in neural connectivity can be detected in young children with social developmental concerns. Our findings add to previous studies that demonstrated the involvement of the amygdala and frontal orbital cortex in social perception, and the cerebellum and striatum in language processing. Future research will examine specific concerns (social, speech, symbolic) and structural differences.

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A. MACKAY-BRANDT, S. COLCOMBE, R. TOBE, C. CRADDOCK, M. KRAMER, K. TRAUTMAN, M. BRELAND, L. PANEK, A. LIEVAL, C. GESSNER, G. D'AMBROZIO, S. CARELLI, B. BENGYAK, J. BEATINI, J. CALIXTE, M. SITAL, S. BURROWS & M. MILHAM. The Nathan Kline - Rockland Sample: An Open-Science Data Sharing Resource.

Objective: The Nathan Kline - Rockland Sample (NKI-RS) is comprised of several large-scale multimodal imaging samples of brain development through aging. The goal is to advance mental health research by providing a deep characterization of lifespan brain-behavioral development within a rich biopsychosocial assessment. A key feature is to provide these data as an open-science resource to the research community, pre-publication, throughout ongoing data collection.

Participants and Methods: The NKI-RS aggregate lifespan cross-sectional dataset includes 1,369 participants between the ages of 6 and 85 years. Recruitment was community-based via street fairs, mailings, flyers, community events and word-of-mouth. The recruitment area focused on suburban Rockland county in New York (and neighboring Westchester, Bergen, and Orange counties). In addition to brain imaging, participants completed approximately 6 hours of cognitive, psychiatric, behavioral, and health measures across experimental paradigms and standard clinical measures. Inclusion criteria were aimed to capture a broad range of variation in physical and mental health. Item-level self-assessment data are available, along with all other data types, to researchers via an online database. Detailed documentation of inclusion/exclusion criteria, tests administered, and imaging protocols can be found on the program website: http://fcon_1000.projects.nitrc.org/indi/enhanced/.

Results: Sample Descriptive Information

N = 1,369

Age: 6-85 years (M = 37.59, SD = 22.06)

Gender: 60% female.

Ethnicity: 1% American Indian/Native Alaskan, 5% Asian, 17% Black/African American, .5% Native Hawiian/Other Pacific Islander, 73% White, 3% Other.

13% Hispanic/Latino.

Education: 9-21 years. 1% less than HS, 10% HS, 30% some college, 30% bachelors, 29% graduate.

DSM diagnoses reflect prevelance rates for a community sample.

Conclusions: The NKI-RS program is commited to accelerating the pace of scientific discovery via open-science data sharing. Rockland-Sample. Enduser@nki.rfmh.org for more information.

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A. OMISADE, C. O'GRADY, J.D. FISK & M. SCHMIDT. Visual and auditory functional MRI (fMRI) language paradigms: Concuerrent validity, robustness, and role in pre-surgical determination of language dominance.

Objective: Functional MRI (fMRI) is a non-invasive method of determining language dominance for epilepsy surgery but validated, standardized protocols are lacking, particularly for individuals with visual or cognitive limitations. We compared language dominance as determined by a novel auditory paradigm and by a visual language mapping paradigm (our center's standard of care). We examined whether the results are robust across paradigms.

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Participants and Methods: Thirty right- and 20 left-handed healthy participants completed both paradigms, which included silent word generation, sentence completion, naming, and either passive listening or reading. Language dominance (right, left, or bi-lateral) was determined in two ways. Numbers of voxels with significant activation in left and right temporal and inferior frontal lobes provided language laterality indices (LI's) while a neuropsychologist determined language laterality based on visual review of anonymized fMRI maps.
Results: LI's revealed 96% agreement in language dominance between the two paradigms (98% for right-handers, and 90% for left-handers). His rates of agreement remained consistent across a range of statistical thresholding levels used to identify voxel activation. Compared to clinician laterality classification, auditory and visual paradigms showed 90% and 88% agreement, respectively; agreement was high for both right-handers (visual=93%, auditory=93%) and left-handers (visual=80%, auditory=85%).
Conclusions: Our novel auditory fMRI paradigm showed high and robust agreement with our current standard visual paradigm in a healthy sample, regardless of whether language dominance was established on the basis of LI's or blinded clinician ratings. Discordant language dominance was most common in individuals classified as bi-laterally dominant using any of the methods. We recommend that clinical interpretation of fMRI maps be based on multiple determinations of laterality. Evaluation of both paradigms in patients with epilepsy is required.
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T. RHOADS, S.K. HILL & S. KEEDY. Neuroanatomy of Auditory Hallucinations and Implications for Severity in Psychotic-Spectrum Illnesses.
Objective: Auditory verbal hallucinations (AVH) have been established as a hallmark of psychotic-spectrum disorders. AVHs are thought to involve left inferior frontal gyrus (IFG) and left superior temporal gyrus (STG). The relationship between AVH severity and GMV has not yet been examined in the context of either DSM diagnosis or psychosis biotype. Using Bipolar-Schizophrenia Network for Intermediate Phenotypes (B-SNIP) consortium data, this study evaluated GMV differences in both systems as well as the relationship between AVH severity and GMV within and between diagnostic groups and psychosis biotypes.
Participants and Methods: Participants were probands with schizophrenia (n = 205), schizoaffective disorder (n = 133), bipolar disorder with psychotic features (n = 173), and healthy controls (n = 119).
Results: In the context of DSM diagnosis, schizophrenia and schizoaffective groups had lower IFG and STG volumes compared to controls. In the context of psychosis biotype, groups were more distinct. That is, biotype 2 and biotype 3 had lower STG volumes compared to controls, while biotype 1 and biotype 2 had lower IFG volumes compared to controls. Biotype 1 also had lower IFG volumes compared to biotype 3. As predicted, AVH severity was negatively correlated with GMV.
Conclusions: Biotype classification represents a more sensitive method in terms of discriminating between groups based on the relationship between AVH severity and GMV in IFG. This finding is consistent with previous empirical studies demonstrating that biotypes provide a more promising classification system for differentiating between biologically-defined psychotic disorders.
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L. STEBBINS, C. GOLDEN, D. AMEN, D. TAYLOR & K. WILLEUMIER. Post-Traumatic Stress Disorder Alterations in Brain Activity Measured by a Single Photon Emission Computed Tomography Imaging.
Objective: To test whether Post-Traumatic Stress Disorder (PTSD) alters brain activity compared to a Healthy group at concentration, as measured by a single photon emission computed tomography (SPECT) imaging.
Participants and Methods: Participants were selected by DSM-IV diagnoses from a de-identified, archival database. The sample (n =190) included a PTSD group (n =109, M_{age}=43.4, 26 Males, 71.6% Cau.) and a Healthy group (n =81, M_{age}=41.9, 37 Males, 42% Cau.). Exclusion criteria include participants with comorbid mood or neurological disorders. Cerebral blood flow (CBF) was assessed using SPECT scan during a concentration task (Conners' CPT) in 17 brain areas.
Results: Independent samples t test analysis determined statistically significant ($p<.05$) differences between groups. The analysis yielded a decrease in CBF in the PTSD group in the Left and Right Frontal lobe ($t(190)=2.291$, $p=.023$;$t(190)=2.773$, $p=.006$) and in the Left and Right Motor Sensory brain areas($t(190)=2.761$, $p=.006$;$t(190)=3.107$, $p=.002$). In the Left Temporal lobe, the PTSD group had increased CBF compared to the Healthy group($t(190)=-3.572$, $p< .001$).
Conclusions: Results reveal that PTSD and Healthy individuals have differences in perfusion during concentration. The increase in perfusion in the Temporal lobe, suggests that marked cognitive deficits are related to emotional disturbances. The decreased CBF in the frontal and motor areas suggests diminished capacity for executive and motor sensory control that may be related to an abundant amount of cognitive resources used for the disturbances of affective processing. Decreased CBF in the Left frontal lobe, which consists of the expressive speech center, limits feelings or thoughts of a traumatic event. This shows that while having intense uninhibited emotions, there may be difficulty with translating the event into communicable language, as well. Treatment of PTSD can target discrete brain systems related to these differences in cognitive activity.
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M. TAHMI, W. BOU-ZEID, D. PARKER, J. MANLY & Q. RAZLIGHI. Heterogeneity of β-Amyloid Distribution in the Human Brain.
Objective: We investigate the relationship between β-Amyloid quantitative and visual reading methods used as an imaging biomarker for the diagnosis of Alzheimer's disease. We also, demonstrate the heterogeneity of β-amyloid distribution in the brain in four different scales of brain structure; global, lobar, regional, and vertex-wise.
Participants and Methods: 187 non-demented elderly participants (age from 71 to 97) were scanned for brain β-amyloid using 18F-Florbetaben PET imaging. PET images were classified by one reader as visually positive (AB+) or visually negative for β-amyloid (AB-). Meanwhile, each participant's T1 weighted scan was reconstructed using FreeSurfer software to give cortical and subcortical regional masks using an in-house pipeline. Standardized uptake value ratios (SUVR) were calculated by normalizing each voxel's uptake to the averaged cerebellum gray mater uptake.
Results: - There was a good correlation between visual reading and our global SUVR measure (ROC curve with AUC=0.884)
- Heterogeneity of β-amyloid distribution for positive and negative participants across different brain regions. This heterogeneity is not possible to be delineated with visual reading.
- It was clear from the positive participants that most of the β-amyloid is deposited in the dorsal frontal region and that the right hemisphere presents more deposition of amyloid than the left hemisphere. This level of quantification is not possible with visual reading.
Conclusions: -The regional distribution of SUVR for every cortical and subcortical region in the brain highlights the heterogeneity of β-amyloid between different subjects.
- While binary labeling using visual reading might satisfy the clinical practice purpose by identifying positive and negative PET scans, it provides no specific spatial distribution.
-In the future, reconstructing β-amyloid uptake on the surface of the cortex will make it possible to check whether or not the existance of amyloid in any point on the cortex will be correlated with neuropsychological measures.

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J.J. TANNER, R.B. FILLINGIM, C. PRICE, U. AT UF AND UAB & K.T. SIBILLE. Ethnic and Sociodemographic Group Differences in Non-Frontal Brain Regions.

Objective: Dementia risk is increased in United States non-Hispanic black (NHB) relative to non-Hispanic white (NHW) populations. Differences are at least partially attributable to socioeconomic (SES) and medical factors. Another risk factor could be chronic pain with higher rates of chronic pain in NHB than in NHW. Given chronic pain's structural effect on regions of the brain, some of which are altered in dementia, it is possible these regions demonstrate ethnic group differences. Our aim was to explore ethnic differences in brain structure in adults with and without evidence of chronic knee pain.

Participants and Methods: This retrospective analysis of multi-site data included 174 non-demented participants (75 NHB and 99 NHW) with and without knee pain. T1 images were processed using FreeSurfer. Regions of interest were amygdala, hippocampus, and thalamus and somatosensory (SS), anterior cingulate, dorsolateral prefrontal, medial prefrontal, and insula cortex. Cerebrovascular disease volume was also assessed. Covariates included age, study site, education level, sex, body mass index, and MOCA score. Secondarily, we assessed global cortical thickness group differences.

Results: The groups differed in age, education, MOCA (NHB<NHW; p's<.002) and pain (NHB>NHW, p<.01). There was a significant difference in between-group brain structure (p<.01). Specifically, NHB participants had larger amygdala, thalamus, and hippocampus volumes (p<.01) but thinner SS cortex and insula (p<.01). The secondary analysis showed widespread differences primarily outside the frontal lobes.

Conclusions: The groups irreconcilably differed on key demographic and other variables. With this limitation as context, NHB and NHW groups had structural differences in pain processing brain regions. The etiology of group differences is unknown but could be secondary to lifelong socioeconomic, cultural, and individual factors. Our findings might suggest different brain-behavior relationships by ethnic but are preliminary given the limited matching of the groups.

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A. WATERS, K. SAWYER & D. GANSLER. White Matter Connectometry Among Individuals with Self-Reported Family History of Drug and Alcohol Use Disorders.

Objective: Heredity is an important risk factor for alcoholism. Several studies have been conducted on small groups of alcohol naïve adolescents which show lowered fractional anisotropy of frontal white matter in FH+ groups. We sought to compare large FH+ and FH- groups using white matter connectometry, as opposed to the previously used global tractography method, as it is more sensitive to regional variability. Rather than deriving a diffusion index from a tensor, connectometry uses local density as measured by spin distribution function.

Participants and Methods: Imaging and behavioral data from the Human Connectome Project (WU-MINN HCP 1200 Subjects data release) was used. Groups of participants were positive (n=109) and negative (n=109) for self-reported drug and alcohol use disorders in at least one parent. Groups were matched on gender, age, education, current alcohol usage, and alcohol use disorders (AUD). Connectometry was performed on diffusion MRI in DSI-Studio using q-space diffeomorphic reconstruction, and multiple regression was completed with 2000 permutations. Tracts were selected when FDR < 0.05. To identify major tracts, further analyses were performed with tract length > 40 mm as selection criteria.

Results: Connectometry showed decreased connectivity in the FH+ group in corpus callosum, L/R cerebellum, L/R corticostriatal pathway, L/R u fibers, and the R corticothalamic pathway. Corpus callosum and R cerebellum were identified as major tracts. Post-hoc analyses were completed to determine associations between neurocognitive tasks and connectivity.

Conclusions: Positive self-report of family history of alcoholism was associated with decreased connectivity in cerebellothalamocortical pathways, controlling for alcohol consumption and AUD. This is the first connectometry study of FH+, and extends the neural basis of the hereditary diathesis of alcoholism beyond that demonstrated with global tractography. Regions associated with FH+ are similar to those associated with AUD.

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A. WATERS, S. CHERNYAK & L. NICKERSON. Resting-state Connectivity Between Striatal and Neurocognitive Networks: Associations with Social Cognition and Executive Functions.

Objective: Social cognition, cognitive flexibility, and reward processing deficits are highly co-occurring symptoms across psychiatric diagnoses. Executive control and reward processing circuitry in striatal networks are implicated in these processing deficits, as striatal connectivity may moderate other larger networks. The aim of this study was to examine associations between clinically relevant cognitive measures of these constructs and functional connectivity (FC) between striatal networks and key neurocognitive networks in a healthy sample.

Participants and Methods: FC of brain networks measured using resting state functional magnetic resonance imaging (fMRI) and neurocognitive assessments from the Human Connectome Project ($N = 143$) were utilized for all analyses. Network matrices of the partial correlation between each pair of network fMRI timeseries were used to assess the associations between neurocognitive variables and between network FC using FSL-PALM with 5000 permutations, p<0.05 corrected for family structure. We examined the association between performance on social cognition (Frith-Happé), reward processing and impulsivity (Delayed Discounting), and cognitive flexibility (Dimensional Card Sort) tasks with FC between two striatal networks (DS: dorsal; VS: ventral) and central executive (CEN: left and right), attentional (AN), salience (SN), cingulo-opercular (CON), and default mode networks (DMN: 4 sub-networks).

Results: Increased impulsivity was associated with greater VS-CON and DS-posterior DMN FC. Decreased impulsivity was associated with greater DS-right CEN and DS-SN FC. Social cognition was positively associated with DS-dorsal DMN FC, but negatively associated with VS-left CEN and VS-anterior DMN FC. Cognitive flexibility was negatively associated with DS-ventral DMN FC and positively with DS-SN.

Conclusions: Lowered cognitive performance and greater impulsivity were generally associated with greater resting state FC between neurocognitive networks and VS, whereas the inverse was true for DS.

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J. WILLIAMS, A. TART-ZELVIN & B. MAKWANA. The Development of Semantic Knowledge Indicated by Patterns of Diffusion Tensor Imaging.

Objective: This study examined the relationship of brain development measured using Diffusion Tensor Imaging (DTI) to the development of semantic knowledge.

Participants and Methods: The study sample consisted of 550 healthy children and adolescents from the National Institute of Health MRI Study of Normal Development, a longitudinal behavioral and neuroimaging study of normal children. Age included newborns to 18 year olds. Raw scores from the Preschool Language Scale, California Verbal Learning Test-Child Version, NEPSY verbal fluency, Wechsler Abbreviated Scale of Intelligence and the Woodcock-Johnson were selected for

analyses. Semantic knowledge was also abstracted from the language measures using factor analysis. Fractional Anisotropy (FA) and Mean Diffusivity (MD) derived from DTI were analyzed. Analyses included linear regression of structural imaging measures and the cognitive tests. This was done by regressing FA and MD values for Regions of Interest (ROIs) defined by the Automated Anatomical Labeling (ALL) system.
Results: Performance on measures of semantic knowledge correlated with FA and MD in a similar pattern in which greater white matter differentiation in the left temporal lobe is associated with higher scores on tests of semantic knowledge; MD in the bilateral frontal lobes correlated negatively with performance. Verbal fluency positively correlated with DTI measures in the bilateral occipital and orbital frontal lobes. MD correlated negatively with verbal fluency in the bilateral frontal lobes.
Conclusions: This study was remarkable in finding patterns of brain development of language and memory that are similar to the findings of functional imaging studies and lesion studies. Language development was associated with development of the left hemisphere. This pattern also suggested that the brain develops from the posterior sensory areas toward the frontal areas. Presumably language comprehension and semantic knowledge develops first followed by speech and language motor function.
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Neurophysiology/EEG/ERP

T. AGATE, I. GORDON, J.E. KARR & M. GARCIA-BARRERA. Electrophysiological Markers of Reward Processing in Athletes: Do Sports Expertise and Exercise Play a Role?
Objective: Prior research has revealed potential effects of sports expertise and physical exercise on cognition, though there is limited research investigating their effects on the emotional-processing aspects of executive functioning (e.g., valence and reward processing important for decision making). The present study aimed to address this by examining the roles of sports expertise and exercise in predicting event-related brain potentials (ERPs) during a reward-processing task.
Participants and Methods: A total of 22 athletes (55% females) between the ages of 18-27 participated in this study. Participants completed a reward task in a "virtual T-maze" environment that elicits the reward positivity (RewP), an ERP component associated with reward processing. Sports expertise and amount of strenuous exercise per week were investigated as potential predictors of RewP peak amplitude. As a secondary analysis, reward positivity was compared between the athletes and a group of 23 sedentary controls (57% females; age range: 18-25).
Results: A multiple regression analysis showed that sports expertise and amount of strenuous exercise explained a significant proportion of variance in RewP peak amplitude of athletes, $r^2 = .53$, $F(2,16) = 9.05$, $p < .01$. Sports expertise significantly predicted RewP peak amplitude, $\beta = -.48$, $t(16) = -2.78$, $p = .01$, as did amount of strenuous exercise, $\beta = -.51$, $t(16) = -2.93$, $p = .01$. An independent samples t-test showed no significant difference in RewP peak amplitude between athletes (M= -13.8, SD= 10.1) and sedentary controls (M= -9.8, SD= 8.7), t (43)= -1.43, $p = .16$, $d = -.43$.
Conclusions: Results indicate that sports expertise and amount of strenuous exercise may together predict heightened electrophysiological response to reward in athletes. Moreover, each may independently account for this response, showing similar contributions. Potential implications are discussed for decision-making, an integral cognitive process in sports that is driven by reward processing.
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S. BREZOVAR, J. DREO, I. CUKJATI & G. REPOVŠ. Impact of high altitude exposure on early visual processing.
Objective: Contemporary science has shown that high altitude exposure might significantly impact visual processing. However, only few studies have tried to study cognitive processes at real-life environment, using objective, electrophysiological methods. The aim of our research was to study, how does high altitude impact early visual processing.
Participants and Methods: Six climbers participated in Mt. Elbrus Expedition (5642 m) and 10 climbers participated in Muztagh Ata Expedition (7546 m). We collected EEG/ERP measurements during visual evoked potential (VEP) checkerboard task at four time points: before the expedition, during the expedition, one week after the expedition, and one month after the expedition. Two different types of checkerboards (bigger and smaller squares) were used to observe whether responses to complex stimuli are more affected than responses to simple stimuli.
Results: The results of our study showed that high altitude exposure influenced early stages of visual processing. Specifically, we observed prolonged latencies and decreased amplitudes of early VEP components (N1 and P1). Responses to the complex stimuli were affected more than responses to simple stimuli. After the expedition latencies and amplitudes were returning to baseline, changes however persisted even a month after expedition.
Conclusions: Our results has shown that prolonged high altitude exposure impacts early stages of visual processing, reflected in prolonged latencies and decreased amplitudes of N1 and P1. It seems that processing of targets with smaller fields is more affected than processing of targets with larger fields. Interestingly, it seems that high altitude might produce some permanent changes of visual system. The results of our study provide important insights in the mechanisms of cognitive changes at high altitude. In further study we want to study how does high altitude influence more complex cognitive processes.
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S. GUAY, J. HÉROUX, V. BLANCHETTE, C. BEAULIEU & L. DE BEAUMONT. Neurophysiological substrates of emotional treatment during a dynamic emotional facial expression task: An attempt to objectively measure empathy in young and aging adults.
Objective: In its modern conception, empathy results from an automatic process of internal simulation of a perceived emotion in which the same neural circuits inherent to its direct experience are recruited. Although empathy is an indispensable tool throughout life, results in normal aging remains sparse and largely supported by subjective measures. Thus, the current study aimed to explore the evolution of empathy in normal aging and between sex by focusing on the neurophysiological response (mu rhythm) resulting from the observation of emotional facial expressions (EFE).
Participants and Methods: A total of 65 participants, including 33 young adults (between 18 and 35 years old) and 32 seniors (between 55-75 years old), took part in this study. They were exposed to 500-ms video clips of dynamic facial expressions of joy, fear and neutral during which they were asked to feel each emotion while electroencephalography (EEG) responses were recorded. They also completed the Empathy Quotient (EQ) as a subjective and behavioral measure. Mu rhytm was investigated
Results: A statistically significant Group * Emotional Valence interaction was oberved, where mu rhythm responses were different between emotional and neutral stimuli in young adult, but not in aging adult. A main effect of sex was also observed, where women exhibited stronger mu rhythm in general compared to men, regardless of their age. However, Significant age-related differences have also been observed and showed that modulation of the mu rhythm is becoming comparable between EFEs in senior women, but not in yougng women. As for the self-report empathy questionnaire, aging adults scored significantly lower than young adults.
Conclusions: These findings suggest that mu rhythm is a potential neurophysiological marker sensitive to age and sex as part of an empathic process and could therefore serve as an objective measure to study empathic abilities when exposed to dynamic emotional stimuli.

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N. HENNIG, J. RENSBERGER, D. BOSCH & A.A. TURK NOLTY. Heart Rate Variability and Spirituality as Factors of Resilience in Humanitarian Aid Workers.

Objective: The human body has devised mechanisms to adapt to stressful situations, such as the sympathetic and parasympathetic systems of the autonomic nervous system. Heart rate variability (HRV) is an index of the flexibility of the autonomic nervous system – the ability to adjust to stressors by adjusting level of arousal, breathing, heart rate and attention, with higher resting HRV believed to reflect the capacity for quick recovery from stress. Because individuals who turn to religious coping strategies to manage stressful situations have been found to be more resilient, it was hypothesized that a higher HRV would be correlated with higher levels of spiritualty.

Participants and Methods: For this project, 13 humanitarian aid workers completed the 32-item World Health Organization Quality of Life – Spirituality, Religiousness, and Personal Beliefs (WHOQOL-SRPB) measure and had their resting HRV measured using a Polar RS800CX heart rate monitor chest band.

Results: There was a significant positive correlation between HRV and the WHOQOL-SRPB subscale of Hope/Optimism. However, unexpectedly, there were significant *negative*correlations between HRV and 6 of the 8 facets of spirituality of the WHOQOL-SRPB, in the domains of Meaning, Awe, Connectedness, Spiritual Strength, Inner Peace, and Faith.

Conclusions: These findings suggest that higher resting HRV is associated with lower spirituality. While these findings are different than anticipated, they may potentially be explained by a greater connection between one's ability to utilize physiological mechanisms of self-regulation than turning to external sources of self-regulation such as spirituality. Additionally, these findings suggest that lower resting HRV is associated with higher spirituality, which may mean that those who struggle to use physiological mechanisms of self-regulation tend to rely more heavily on external sources of regulation such as spirituality.

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K. HOLLAND, J. REYNOLDS, C. DELGADILLO, T. HAYES & D.W. HARRISON. Changes in Right Temporoparietal Activation in Women with High and Low Levels of Trait Rumination: Examining the Influence of Arousal Level on Visuospatial Task Performance.

Objective: Trait rumination (TR) is traditionally defined as the tendency to dwell on undesirable events, and includes cognitive and behavioral components that overlap with the constructs of hostility and anger. Neurophysiological indicators of reductions in regulation of the right temporoparietal regions have been associated with high levels of TR. We predicted that women with high levels of TR would show decrements in performance on a visuospatial task and increased systolic blood pressure (SBP) in high arousal conditions.

Participants and Methods: Women scoring high (n=20) and low (n=21) on the Anger Rumination Scale completed the Mental Rotations Task (MRT). Half the women in each group completed the MRT while listening to white noise. SBP readings were taken from all participants.

Results: A main effect approaching significance was found for the total number of problems attempted ($F(1, 40)=3.17$, $p=.08$). For the low arousal condition, a main effect for TR for the number of correct responses was found ($F(1, 20)=6.44$, $p=.02$). Women with low levels of TR made more correct responses on the MRT. An Arousal X Condition interaction was found for SBP ($F(1, 38)=.62$, $p=.01$). Surprisingly, women with high levels of TR showed reduced SBP after completing the MRT relative to low TR women.

Conclusions: The results provide partial support for our hypothesis. Women with low levels of TR demonstrated enhanced performance on the MRT, although they evidenced increased SBP upon completion of the MRT. Exposure to high arousal conditions may serve as a mediator for changes in right hemisphere activation in women with high levels of TR.

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K. LEE, A. FOX, L. NOTEBAERT, C. REID, M. ANDERSON & S. O'TOOLE. Predictive Effects of Performance Monitoring on Obsessive-Compulsive Symptomatology in Children.

Objective: Performance monitoring has been proposed as a biomarker of obsessive-compulsive disorder. One of the key advantages of a biomarker is the ability to predict the risk of developing a particular psychiatric disorder. Evidence supporting predictive validity should demonstrate that the candidate biomarker measured at an earlier timepoint predated the emergence of psychopathological symptoms at a later timepoint. The aim of this longitudinal study was to examine whether performance monitoring predicted the emergence of obsessive-compulsive symptomatology in children.

Participants and Methods: The sample consisted of 26 children, recruited from the general population, with ages ranging from 7 to 9 years old ($M = 7.62$, $SD = 0.94$). The participants came back for a follow-up study after two years. A modified flanker task was administered at both timepoints to elicit error responses. Electrophysiological data were recorded during the flanker task. The error-related negativity (ERN) was used as an electrophysiological index of performance monitoring. The Obsessive Compulsive Inventory-Child Version was administered to measure the multidimensional obsessive-compulsive symptomatology during the follow-up test.

Results: The results demonstrated that Mean ERN Amplitude measured at Time 1 was a significant positive predictor of Ordering Subscale measured at Time 2, even after accounting for the covariate effects of Accuracy.

Conclusions: The findings suggest that hypoactive performance monitoring, measured two years prior, predicted the emergence of ordering symptoms later in childhood. Hence, the present study provides evidence suggesting that hypoactive performance monitoring is a neurocognitive biomarker of ordering symptoms in children.

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T.L. MCKINNEY, R. CARLSON, H. CULBERTSON, K. LIN & M.J. EULER. Mindfulness and aerobic physical activity promote sustained attention and reduced neural correlates of mind-wandering.

Objective: Mindfulness meditation and physical activity have been accumulating evidence for their cognitive benefits in neuropsychiatric conditions. However, most of this evidence is based on self-report measures, with few studies examining the cognitive effects of these healthy lifestyle choices using performance-based, neuropsychological measures. Even less is known about the potential neural basis of these benefits. This study helps address this gap by examining the neurocognitive correlates of mindfulness and aerobic activities during a sustained attention task.

Participants and Methods: A sample of college students ($n = 33$) completed a modified CPT task during EEG recording. Participants were dichtotomously grouped based on self-reports of engaging in either mindful (meditation or yoga), or aerobic activities, or not. Multi-level models assessed the effect of group and task duration on Decision Time (DT), DT variance (DTSD), and posterior alpha power (a putative neural correlate of mind-wandering).

Results: On average, DT was faster ($\beta= -0.5$, $SE=0.01$ $p<0.001$) during the second half of the CPT compared to the first half. This main effect of time interacted with mindfulness such that practice promoted not only faster overall DT ($\beta= -0.04$, $SE=0.007$ $p <0.001$), but also less variable

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DT as time went on (β= -0.03, SE =0.01, p<0.001). Similarly, posterior alpha power increased across time (β= 0.04, SE=0.09 p<0.001), but practicing mindfulness mitigated this increase (β =-0.02, SE=0.01, p<0.001). Engaging in aerobic exercise also promoted faster DT (β= -0.04, SE=0.01, p<0.001) and reduced DTSD (β= -0.03, SE=0.01, p<0.001), and similarly mitigated increases in alpha power across task duration (β = -0.03, SE=0.01, p<0.001).

Conclusions: These results support a link between mindfulness meditation, yoga and aerobic physical activity and better sustained attention. Additionally, this may reflect resilience to mind-wandering, as evidenced by attenuated alpha power increases at long task durations.

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T.L. MCKINNEY, R. CARLSON, E. VACCARIELLO & M.J. EULER. Novelty effects: Personality trait or indicator of cognitive dysfunction?

Objective: Exaggerated reactions to novelty (i.e., novelty effects; NE) have been suggested as a potentially sensitive indicator of cognitive dysfunction or vulnerability. This motivates additional investigation of other cognitive and personality correlates of this phenomenon, and their neural corelates. This study used the 3-stimulus oddball task, which manipulates stimulus novelty, to examine the neurocognitive correlates of NE in healthy participants.

Participants and Methods: Thirty-three healthy college students completed the Intolerance of Uncertainty Scale (IU), which measures uncertainty-induced anxiety as a personality-based index of NE. They then performed the oddball task during EEG recording. Participants were dichotomously grouped according to IU scores, and multi-level models were used to assess the effects of IU, stimulus novelty, and task-duration on reaction times (RT), and EEG indices of one's need for cognitive control (medial frontal theta power; MFT) and mind-wandering (posterior alpha power).

Results: On average, RTs were longer on novel trials (β = 0.12, SE = 0.01, p < 0.001) and during the second half of the task (β = 0.06, SE = 0.01, p < 0.001), with high IU people having disproportionately longer RTs on novel trials (β = 0.04, SE = 0.02, p = 0.03). Although high IU individuals exhibited smaller increases in RT (β = -0.02, SE = 0.0,1 p = 0.02) and alpha power over time (β = -0.02, SE = 0.01, p = 0.003), this was also linked to greater MFT increases as the task went on (β = 0.02, SE = 0.01, p = 0.03).

Conclusions: Overall, these results indicate that while greater IU is associated with good sustained attention and resilience to mind-wandering (in healthy subjects), this may come at the cost of more effortful cognitive control and NE. Future studies should seek to clarify whether NE truly reflects a risk factor for cognitive deficits, or a personality trait that confers both advantages and disadvantages on neuropsychological performance.

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J. REYNOLDS, K. HOLLAND, C. DELGADILLO & D.W. HARRISON. Neurophysiological Indicators of Changes in Right Hemisphere Activation in Response to Changes in Arousal Level and Cognitive Stress.

Objective: The right hemisphere is differentially involved in arousal and spatial ability. The network of neurons responsible for processing overall arousal level, the mesencephalic reticular formation (MRF), is concentrated in the right hemisphere. Reductions in the capacity of the right frontal region to inhibit activation of the MRF results in over arousal, which may result from exposure to stress. We predicted that women exposed to cognitive stress in high arousal conditions would evidence a reduced capacity to process these stressors concurrently.

Participants and Methods: Undergraduate women were randomly assigned to a low arousal condition (n=20) where they completed the Mental Rotations Task (MRT) in a sound-attenuated room, and a high arousal condition (n=20), where they completed the MRT while listening to white noise played at 85 decibels. Heart rate (HR) and systolic blood pressure (SBP) were recorded across conditions.

Results: A main effect for Condition was found for SBP ($F(1, 38)=5.55$, p=.02), indicating increased SBP before completing the MRT. An Arousal x Condition interaction was also found for SBP ($F(1, 38)=4.05$, p=.05) and for HR ($F(1, 38)=5.91$, p=.02). Women in the high arousal condition evidenced a significant reduction in SBP and HR after exposure to cognitive and neurophysiological stress.

Conclusions: While women in the high and low arousal conditions performed similarly on the MRT, changes in SBP and HR indicate enhancement in right frontal regulatory control of temporoparietal regions. This effect may be due to potential effects of anticipatory stress in the high arousal condition. Future research is needed to determine this relationship.

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M. KADZIOLKA, A. SCAVONE & C.J. MILLER. Mindfulness and Skin Conductance Response.

Objective: Skin conductance response (SCR) reflects self-regulatory autonomic activity and is a measure of arousal in response to stress or challenge. Increased SCR reflects repressive coping when faced with a novel or challenging experience (Barger, Kircher, & Croyle, 1997). Increased sympathetic tone has also been noted to play a role in depressive disorders, indicating the link between negative thinking and physiological arousal (Agelink et al., 2002). Mindfulness, particularly among Zen meditation practitioners, has been associated with reduced activation of skin conductance response during stress (Austin, 2006). The current study examined whether mindfulness induction is associated with lower sympathetic reactivity in a non-clinical sample.

Participants and Methods: Participants were 55 undergraduate students. They completed baseline skin conductance response (SCR) recordings, an emotional stressor task, a mindful breathing exercise (MBE), and a recovery phase. Participants completed the self-reported Toronto Mindfulness Scale (TMS). Bivariate correlations were carried out between the TMS and SCR across several experimental phases.

Results: As predicted, those with higher mindfulness scores on the TMS showed a larger drop in SCR between the interview and the recovery phase (r=.37) and between the stress task and the MBE (r=.37).

Conclusions: The results suggest that an increase in mindfulness contributes to a larger drop in SCR, an indicator of sympathetic reactivity, after a stressful event. As mindfulness involves non-judgmental focus on the present moment, the present findings support the notion that negative thinking is associated with physiological arousal. Mindfulness exercises are likely beneficial in decreasing sympathetic reactivity which allows for greater emotional self-regulation and decreased depression.

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S. SHELDON, J. GORDON & V. ZEMON. Exploring Relations Between Neurophysiological Latency and Processing Speed: A Visual Evoked Potential Study.

Objective: The goal of this study was to investigate neurophysiological mechanisms associated with cognitive abilities. This nascent research field has explored early components of visual processing by recording visual evoked potentials (VEPs). These prior studies found faster neural processing correlated with faster performance on behaivoral processing speed tasks with protocols using at least 20 electrodes (several electrophysiological channels). The current study examined associations

between processing speed and latency of transient VEPs (tVEPs) using an efficient protocol with only three electrodes (a single recording channel).
Participants and Methods: Healthy young adults ($N = 37$, 19 females) were tested. tVEPs were elicited by contrast-reversing checkerboards (100% contrast) presented in long-duration (single 1-min run) and novel short-duration (10 2-s runs) conditions. Latencies of tVEP deflections were labeled as positive [P] peaks and negative [N] troughs based on time of occurrence in ms: P_{60}, N_{75}, P_{100} and N_{135}. Processing speed was measured using the Symbol Digit Modalities Test (SDMT) and the Trail Making Test (TMT) - A & B.
Results: Negative correlations were found between latencies of N_{75} and performance on TMT-B (rs: -.35 – -.47, $ps < .05$). Correlations between N_{75} latencies and SDMT and TMT-A were not significant. Multiple linear regressions run to determine predictive ability of tVEP latencies on TMT-B scores approached significance for the long- ($F(4, 31) = 2.41$, $p = .064$, $R^2 = .24$) and short-duration ($F(4, 31) = 2.59$, $p = .059$, $R^2 = .25$) conditions.
Conclusions: Significant negative relationships were found between N_{75} latencies, which reflect timing of excitatory cortical activity, and processing speed and set shifting (TMT-B) performance. This supports previous work and demonstrates the efficacy of an efficient single-channel VEP protocol. Overall, results show promise for the use of the tVEP to elucidate and quantify cognitive functions.
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C.L. MONTERO, E.J. AHNE, I. VELEZ-URIBE & M. ROSSELLI. Emotion Word Processing in English Monolinguals and Spanish-English Bilinguals: An ERP Study.
Objective: An event-related potentials (ERPs) study was conducted with emotion words in English monolinguals (EM) and Spanish-English bilinguals (SEB). Two ERP components were analyzed. For the early posterior negativity (EPN), it was hypothesized that EM would have shorter latencies than SEB. No differences were expected for the EPN amplitude. For the late positive component (LPC), it was expected that SEB would have longer latencies and lower amplitude compared to EM. The expected differences would be evident in negative and positive, but not neutral words.
Participants and Methods: Forty-seven EM and forty-seven SEB performed a word-rating task (WRT) with 330 English words from three valence categories (positive, neutral, negative). Averaging was conducted based on word onset. Amplitude and latency for both ERP components (EPN and LPC) were extracted from 200-400 ms and 400-650 ms segments, respectively, to be used as dependent variables.
Results: The results indicated no significant main effect of language group in amplitude for either component, nor the LPC latency, however, the EPN latency approached significance, $F(1, 92) = 3.63$, $p = .06$, $\eta p^2 = .98$. For EPN amplitude, the main effect of valence was significant, $F(2, 184) = 5.17$, $p = .01$, $\eta p^2 = .05$. For LPC amplitude, the main effect of valence, $F(2, 184) = 30.98$, $p = .000$, $\eta p^2 = .25$, and the main effect of electrode, $F(2, 184) = 100.24$, $p = .000$, $\eta p^2 = .52$, were significant. For both EPN and LPC, emotion words presented higher amplitudes than neutral words. The LPC amplitude also differed across electrodes, and was higher on the left than on the center and on the center than on the right parietal electrodes.
Conclusions: These findings highlight the effect of valence for both ERP components. However, it might suggest similar emotion word processing in SEB and EM, and could reflect on the high level of English proficiency in SEB. Future studies should include both languages in bilinguals and take proficiency of L1 and L2 into account.
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T. ZURLINDEN, D.E. EVERHART, E. WATSON, A. NICOLETTA, A. WINTERS & A. GENCARELLI. The Correlation Between Middle Alpha Power and Pain Ratings.
Objective: Pain has previously been associated with significant physiological, psychological, and behavioral effects. The purpose of this current study was to explore the connection between EEG (electroencephalogram) alpha waves and pain ratings.
Participants and Methods: This study examined data from 58 college students (39 women). Alpha Band frequency was recorded based on the Universal 10-20 system, and data were analyzed from 10 scalp sites. Alpha band power was calculated from low (7.8 – 8.8 Hz), middle (8.9 – 10.7 Hz), and high (10.8 – 12.7 Hz) bandwidths. Pain scores were taken from the SF-12v2 question five, which asks about the interference of pain with everyday life on a scale of "Not at all" to "Extremely."
Results: Subjective pain ratings were correlated with middle alpha power at the F7 ($r^2 = -.362$, $p = .003$), F3 ($r^2 = -.330$, $p = .006$), F4 ($r^2 = -.307$, $p = .010$), F8 ($r^2 = -.294$, $p = .012$), T3 ($r^2 = -.306$, $p = .010$), C3 ($r^2 = -.231$, $p = .040$), and O2 ($r^2 = -.244$, $p = .038$) electrode sites. Pain ratings were also a significant predictor of middle alpha power at the F7 electrode site ($\beta = -.389$, $p = .008$), as well as high alpha power at the F7 electrode site ($\beta = -.336$, $p = .020$).
Conclusions: Overall, there is a significant correlation between pain and alpha subband power, specifically the middle band. Additionally, pain ratings are a significant predictor of middle and high alpha power at the F7 scalp site. Possible explanations are discussed.
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Symposium 15. New Horizons in Cognitive Rehabilitation

Chair and Presenter: John DeLuca

Presenters: Nancy D. Chiaravalloti, Natalia Ojeda del Pozo, Benjamin Hampstead

10:45 a.m.–12:15 p.m.

J. DELUCA, N.D. CHIARAVALLOTI, N. OJEDA DEL POZO, B. HAMPSTEAD & G. REBOK. New Horizon's in Cognitive Rehabilitation.
Researchers and clinicians emphasize the importance of effectively treating cognitive dysfunction in many neurological and psychiatric populations largely due to the substantial impact of cognitive deficits on daily life. Evidence has been accumulating in support of cognitive rehabilitation across many domains of functioning in various populations. Well-designed studies have shown improved objective cognitive performance, everyday life activities, and brain function post-treatment. Evidence of transfer of training from CR to daily life activities has also been noted in some populations.
The current symposium includes presentations from leaders in cognitive rehabilitation in multiple populations in which cognitive deficits are prominent: Multiple Sclerosis (MS), Traumatic Brain Injury (TBI), dementia and schizophrenia. Each presentation will discuss new development in cognitive rehabilitation within the population of focus as well as necessary future direction to advance the field.
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J. DELUCA. Cognitive Rehabilitation in Multiple Sclerosis.
Multiple sclerosis (MS) is a progressive neurological disease marked by the development of lesions, or plaques, throughout the brain and spinal cord, impacting both the white and grey matter. Cognitive deficits are

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common. Long term memory is one of the most consistently impaired functions identified in persons with MS, evident in 40%-65% of patients. This memory deficit has been shown to result from impairment in *new learning* abilities specifically (i.e., poor acquisition of material to be remembered, with generally intact retrieval).

Cognitive deficits in persons with MS have been shown to exert substantial impact on everyday life and overall quality of life (QOL). Persons with MS with cognitive impairment participate in fewer social and vocational activities, have higher rates of unemployment and show greater difficulties completing routine household tasks. Deficits in new learning and memory in particular have been shown to result in a reduced ability to make decisions that could affect functioning in everyday life, negatively impacting daily living. The effective amelioration of memory deficits would thus improve everyday functioning, greatly reducing the impact of the disease on the lives of individuals with MS. Research conducted at our center indicates that improved cognition following effective cognitive rehabilitation is accompanied by improvement in daily activities and QOL.

The current presentation will focus on research being conducted to advance the cognitive rehabilitation of persons with MS, emphasizing the work being done at Kessler Foundation.

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N.D. CHIARAVALLOTI. New Advances in Cognitive Rehabilitation in TBI.

TBI is a major public health issue, with 2.8 million TBIs occurring in the US in 2013 and 3.2-5.3 million people in the US currently living with long-term disabilities resulting from TBI. Cognitive impairment is common TBI and cognitive deficits exert a significant impact on daily life functioning and overall quality of life. The identification of effective treatment for cognitive impairment post-TBI could result in substantial improvement in a person's daily life. The current presentation will discuss recent progress in the cognitive rehabilitation of persons with TBI through research conducted at Kessler Foundation. Cognitive rehabilitation interventions discussed will focus on newly developed and recently tested protocols, including interventions for new learning and memory as well as Processing Speed. Future directions and needs will also be discussed.

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N. OJEDA DEL POZO. Cognitive Rehabilitation for Persons with Schizophrenia.

Cognitive impairment in Schizophrenia is a core symptom of the illness and several authors have suggested the possibility of these deficits as being endophenotypes of the illness as well as the best predictors of functional outcome. The profile of the cognitive deficits is extensive, vary and stable along the phases of the illness showing no recovery despite clinical symptoms mitigation. As pharmacological treatment has shown limited benefits in the improvement of cognitive problems, the interest has focused on the development of cognitive remediation programs which overall has shown moderate effect sizes in improving both, neuropsychological deficits and functional outcome. These benefits have been described despite the age, chronicity, or type of treatment. The current presentation will focus on research being conducted to advance the cognitive rehabilitation of patients with Schizophrenia, with focus on the programs developed at the University of Deusto, and future guidelines for clinical practice.

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B. HAMPSTEAD. Cognitive Rehabilitation in Neurodegenerative Diseases.

Cognitively oriented treatments (COTs) were historically overlooked and even actively avoided for those with neurodegenerative diseases due to the believe that any gains would be quickly mitigated by the characteristic progressive cognitive decline. However, a growing body of evidence has emerged showing that a number of approaches can enhance cognitive functioning across the dementia spectrum. The session will start with a review of such evidence, ranging from specific techniques to enhance targeted cognitive and functional abilities to multi-modal programs that address both cognitive and lifestyle factors. Findings of the individual effects of neuromodulation as well as it's synergistic effects with COTs will be reviewed given the exciting potential this area holds. The session will conclude with a review of existing evidence that suggests COTs may delay clinical progression as well as discussion about the methodological factors needed to evidence such effects. Particular attention will be paid throughout the session to evidence of neurophysiological change (e.g., via functional magnetic resonance imaging, electroencephalography) that may represent intervention-based restoration and/or compensation.

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Paper Session 21. Mild Cognitive Impairment

Moderator: Thomas J. Farrer

10:45 a.m.–12:15 p.m.

K.K. ROBERTSON, E.B. LARSON, P.K. CRANE, B. CHOLERTON, S. CRAFT, W. MCCORMICK, S. MCCURRY, J. BOWEN, L. BAKER & E.H. TRITTSCHUH. The Importance of Two Timepoints: Dementia Incidence Associated with Mild Cognitive Impairment (MCI) in a Community-Based Sample.

Objective: Mild cognitive impairment (MCI) in non-clinic samples often have high prevalence and unclear predictive validity for dementia risk. We used longitudinal data from a community-based cohort to evaluate whether MCI stability over two years reliably identified people who would develop dementia.

Participants and Methods: We evaluated data from the Adult Changes in Thought study. Participants were >65, not demented at baseline, and seen every two years. Cognition was assessed with a screening test and participants with low scores were evaluated to identify incident dementia cases. At baseline 1,721 participants were evaluated for MCI using Petersen et al. criteria. To examine MCI stability over the first two biennial visits, a convenience sub-sample of 708 was also evaluated. We evaluated conversion to dementia for the entire sample and the convenience sub-sample.

Results: At baseline, 738 of the 1,721 participants were identified with MCI (43%). Over a mean of 5.4 years of follow-up, 292 people (17%) developed dementia (200 with MCI, 68%; 92 without MCI, 32%). Baseline MCI was associated with increased dementia risk (Hazard ratio [HR] 3.1, 95% CI 2.5-4.0). For the convenience sub-sample, 254 participants had normal cognition at both time points (36%), 87 participants had MCI then normal cognition (12%), 121 participants had normal cognition then MCI (17%), and 246 participants had MCI at both time points (35%). Over a mean of 5.6 years of follow-up, 178 participants were diagnosed with dementia (25%). Compared to participants with normal cognition at both time points, participants with MCI then normal cognition had dementia HR 1.8 (95% CI 0.9-3.7), which was not significant. Participants with normal cognition then MCI had dementia HR 2.7 (95% CI 1.5-4.8) and people with MCI at both time points had dementia HR 7.1 (95% CI 4.4-11.3), both of which were significant.

Conclusions: Stability of MCI may be useful in identifying a small subset of people with very high dementia risk.

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W.S. KREMEN, D.E. GUSTAVSON, J. ELMAN, M.S. PANIZZON, C. FRANZ, C.A. REYNOLDS, K. JACOBSON, J. ZUBER, M. SANDERSON-CIMINO, H. XIAN, R. TOOMEY & M.J. LYONS. Episodic Memory and Semantic Fluency Predict 6-Year Progression to MCI in Cognitively Normal Middle-Aged Adults.

Objective: Episodic memory and semantic fluency have been predictive of progression to Alzheimer's disease (AD) in older adults. In rigorously defined, cognitively normal midlife adults who were only in their 50s at baseline, we examined if episodic memory would predict 6-year progression to amnestic mild cognitive impairment (aMCI), and if semantic fluency would predict progression after controlling for episodic memory. We also examined if memory predicts change in semantic fluency or vice versa.

Participants and Methods: Participants were 805 male twins in the Vietnam Era Twin Study of Aging: wave 1 (age 56; range: 51-60); 6 years follow-up to wave 2 (age 62; range 56-66). Episodic memory was a composite of Logical Memory, Visual Reproductions, and CVLT delayed recall. MCI was diagnosed according to the Jak/Bondi approach using 18 tests. Age, follow-up time, *APOE* status, multiple health conditions, education, and age 20 general cognitive ability (GCA) were covariates.

Results: Episodic memory predicted progression to aMCI (odds ratio [OR]=5.36). After accounting for episodic memory and covariates, semantic fluency still predicted progression to aMCI (OR=1.90). Adjusting for education had little effect, but ORs increased to 10.02 and 2.17 after accounting for age 20 GCA. A cross-lag model showed that baseline semantic fluency predicted change in episodic memory but not vice-versa; this association was primarily driven by genetic correlations.

Conclusions: These cognitive measures strongly predicted progression to MCI in cognitively normal midlife adults. Interestingly, semantic fluency did not decline, but baseline fluency predicted memory change. Results adjusted for age 20 GCA suggest that greater than expected decline—even while still in the normal range—is a significant risk factor. MCI here is likely due to AD as previous results showed that MCI in this sample was associated with AD polygenic risk. Biomarkers are informative for underlying pathophysiology, but cognition may be even more useful for early identification.

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K.J. MURPHY, S. LEON, D. FARZANFAR, G. ROWE & R. CLIMANS. Addressing and Treating Real-life Memory Problems in Mild Cognitive Impairment.

Objective: To understand the real-life memory problems experienced by older adults at risk of dementia and evaluate whether training in practical memory strategies can address these problems.

Participants and Methods: Self-reported memory problems were gathered from 209 older adults with mild cognitive impairment (MCI; age M=76;SD=8) who participated, between 2013-2017, in a 7 session (6 weekly with 1 month follow-up) multicomponent behavioral intervention program that included evidence-based memory training. Summative content analysis was used to categorize the memory problems. Using the Canadian Occupational Performance Measure (COPM; Law et al., 1994), participants rated their problems on a 10 point Likert scale measuring self-perceived performance and satisfaction with managing the problem. Ratings taken at baseline and at the conclusion of the intervention were available for 171 participants.

Results: Memory problem categories and frequency were: names (37%); future intentions (24%); past information (20%); misplacing objects (13%); and word-finding (6%). Wilcoxon signed ranks tests showed significant improvement in performance ($Z = -6.74$, $p < 0.001$) and satisfaction ($Z = -8.89$, $p < 0.001$). The degree of improvement in performance, but not satisfaction, differed among memory categories ($F(4,167)=3.59, p<0.01$) with word-finding ability not improved by the intervention. Clinical significance convention, based on > 2 points improvement on the COPM, showed 46% of participants improved performance and 59% improved satisfaction with managing their memory problem; percentages closely consistent with the number-needed-to-treat value of 2.4 to effect significant improvement in memory strategy knowledge and use in MCI participants involved in a comparable program (Troyer, Murphy, et al., 2008).

Conclusions: Real-life memory problems in MCI can be addressed through behavioural intervention, demonstrating the vital role of such programs in the secondary prevention of dementia through preservation of functional memory skills.

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D. LOCKE, M. CHANDLER, C. THOMAS, J. CROOK, J.A. FIELDS, V.S. PHATAK, P. LUCAS & G. SMITH. Comparison of Behavioral Interventions for Patients with Mild Cognitive Impairment: Impact on Loved One Partner Outcomes.

Objective: The HABIT Healthy Action to Benefit Independence & Thinking program is a behavioral treatment program including compensatory-based cognitive rehabilitation, cognitive exercise, yoga, support group, and wellness education classes. The objective of this trial was comparison of the impact of each component of the program.

Participants and Methods: 272 patients diagnosed with amnestic MCI and a loved-one partner were enrolled. Dyads were treated in groups where they received 4 of the 5 behavioral interventions described above. The suppressed component was randomly selected. This analysis is focused on changes in the following partner outcomes from baseline to 12 months post-treatment: quality of life (QOL), mood, anxiety, and burden. Effect sizes were calculated as the fitted mean change from baseline for a hypothetical average partner divided by the standard deviation (SD) of the baseline measures where higher values correspond to better outcomes.

Results: Yoga had the greatest estimated positive impact on partner burden (difference=0.35, 95% CI 0.04 to 0.65) and on partner mood (difference=0.38, 95% CI 0.01 to 0.76) at 12 months compared to those with no yoga. Yoga also ranked first for positive impact on partner QOL (difference=0.28, 95% CI -0.01 to 0.56) and second for positive impact on partner anxiety (difference=0.30, 95% -0.04 to 0.64). Partner anxiety was most positively impacted by wellness education (difference = 0.41, 95% CI 0.05 to 0.76). Wellness education ranked second for positive impact on partner QOL (difference=0.31, 95% CI-0.07 to 0.70) and burden (difference= 0.24, 95% CI -0.08 to 0.56).

Conclusions: Providing behavioral interventions to patients with MCI with the support of a loved one partner also impacts outcomes for the partner as well patient-centered outcomes. Participating in a yoga class and wellness education classes showed the strongest impact at 12 months on partner burden, mood, anxiety, and QOL.

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K. HACKETT, R. MIS, R. DIVERS & T. GIOVANNETTI. Sources of Bias in Informant-Rated Everyday Functioning in Mild Cognitive Impairment.

Objective: Relative to dementia, little is known about informant bias in Mild Cognitive Impairment (MCI) with the frequently used Functional Activities Questionnaire (FAQ). We investigated the influence of demographic and relational characteristics on informant-rated reports of everyday function to extend dementia findings to MCI and to the FAQ.

Participants and Methods: 3,545 MCI participants (M age 74.0 ± 8.5; M education 15.4 ± 3.1; 51.7% female) and their informants from the National Alzheimer's Coordinating Center Uniform Data Set

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were included. Informants were stratified according to cohabitation, relation to participant, race, education and sex. Mean FAQ score was compared across groups using univariate general linear model analyses and post-hoc tests for each informant variable. Interactions also were tested between informant variables. All analyses covaried for participant cognition using a cognitive composite score.
Results: After controlling for cognitive performance, mean FAQ scores varied significantly within the following informant categories: cohabitation, relation to participant, race and education (p's<.001, η_p^2's ≤ 02). Mean scores were higher (more impairment) among informants who cohabitate with the participant than those who do not, and among paid caregivers, followed by spouses, then children. Scores were lowest (less impairment) among black informants as compared to all other racial groups. Higher levels of education were associated with higher FAQ scores. A significant interaction indicated that women who live with the participant assigned higher ratings than men who cohabitate.
Conclusions: Demographic and relational characteristics may lead to inaccurate reporting of IADL in adults with MCI due to differences in perceived degree of impairment. As everyday functioning is crucial for diagnostic accuracy and as a clinical trials outcome, it is important to understand and account for potential sources of informant bias.
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E.C. EDMONDS, A.J. WEIGAND, S.N. HATTON, A. MARSHALL, K.R. THOMAS, J. EPPIG, D.A. AYALA, M. BONDI & C.R. MCDONALD. Patterns of Longitudinal Cortical Atrophy in Empirically-Derived MCI Subtypes.
Objective: We previously identified four empirically-derived MCI subtypes via cluster analysis within the Alzheimer's Disease Neuroimaging Initiative (ADNI) and found that the pattern of cortical thinning at baseline for each subtype corresponded to their cognitive profile. We build upon our prior work by examining longitudinal patterns of cortical atrophy within each subgroup.
Participants and Methods: ADNI participants (336 MCI and 149 cognitively normal [CN]) underwent neuropsychological testing and structural MRI annually for up to 4 years. Longitudinal changes in cortical volume were calculated from T1-weighted images using *quantitative anatomic regional change* (*QUARC*) analysis. Cortical volume difference maps were concatenated and a vertex-wise GLM compared difference in cortical atrophy between the CN group and each MCI group, controlling for age, sex, education, days from baseline, and magnet strength.
Results: Compared to cortical atrophy trajectories in the CN group, *Amnestic MCI* (memory deficit at baseline) initially demonstrated greater atrophy rates within bilateral medial temporal lobe regions that became more widespread over time. *Dysnomic MCI* (naming/memory deficit at baseline) showed greater atrophy rates largely localized to temporal lobe regions. *Dysexecutive/mixed MCI* (multi-domain impairment at baseline) showed greater atrophy rates in widespread regions at all timepoints. The *cluster-derived normal* group (34% of the ADNI MCI cohort), who had intact neuropsychological performance and normal cortical thickness at baseline, continued to show normal cognition and cortical atrophy rates comparable to the CN group over time.
Conclusions: Findings suggest that our empirically-derived MCI subtypes have unique cortical atrophy trajectories over time that may have important prognostic value for improving the staging of MCI and prediction of clinical course. These longitudinal data also provide additional evidence that a large proportion of ADNI's MCI cohort represent false-positive diagnostic errors.
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Paper Session 22. Pediatric Epilepsy & Other Pediatric Medical

Moderator: Dalin T. Pulsipher

10:45 a.m.–12:15 p.m.

F.J. BREMM, M. HENDRIKS, C. BIEN & P. GREWE. Pre- and Postoperative Verbal Memory and Executive Functioning in Frontal Lobe Epilepsy Versus Temporal Lobe Epilepsy.
Objective: Earlier studies on the cognitive effects of focal epilepsy syndromes predominantly focused on cognitive functioning in patients with temporal lobe epilepsy (TLE) and after temporal lobe resection. Recently, an increasing number of investigations on cognitive deficits in frontal lobe epilepsy (FLE) have been published. It seems that there is accumulating evidence for a great overlap in preoperatively affected cognitive functions between patients with FLE and TLE. The current study aimed to investigate whether it is possible to differentiate between FLE and TLE patients prior to surgery based on measures that assess verbal memory and executive functioning. Furthermore, since it has been proposed that the two groups develop differently after surgery, the postoperative cognitive profiles were compared.
Participants and Methods: Pre- and postoperative cognitive data of 303 patients with either FLE (n = 109) or TLE (n = 194) were retrospectively analyzed. Groups were matched based on education, duration of epilepsy, and age at preoperative assessment.
Results: Preoperatively, FLE patients did not differ from TLE patients in verbal memory functioning. However, FLE patients performed worse on a cognitive switching task. Postoperatively, no distinctive cognitive development was found on the assessed cognitive functions between patients with FLE and TLE. When taking into account the lateralization of epileptic activity, patients with epileptic focus in the language-dominant hemisphere performed less well than patients with epileptic focus in the non language-dominant hemisphere on measures of verbal memory, both pre- and postoperatively.
Conclusions: Results suggest that the lateralization, not the localization of epileptic activity (frontal vs. temporal) may be the more important variable in evaluating preoperative presentation and postoperative outcome, at least for measures of verbal memory functioning. Measures of executive functioning may be valuable for the identification of patients with FLE.
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C. MONTPETIT, T.B. FAY-MCCLYMONT, B.L. BROOKS & W.S. MACALLISTER. Psychological Functioning among Pediatric Patients with Left vs Right Hemisphere Epilepsy.
Objective: Prior research suggests that psychological presentation may differ between patients with lateralized epilepsy, with depressive symptoms being more common in those with left hemisphere epilepsy and anxious symptoms in those with right. The purpose of this investigation was to examine the differences in psychological functioning in pediatric patients with lateralized epilepsy.
Participants and Methods: The parents of 88 children and adolescents between the ages of 6 and 18 years (n=46 girls, n=42 boys, mean age of 10.85 years, SD=3.36) completed the Child Behavior Checklist (CBCL); all had a clearly lateralized focus on EEG (n=45 left hemisphere, n=43 right hemisphere).
Results: Scale elevation frequencies in the borderline clinical/clinical range were calculated for the number of children with T scores ≥ 65 for the syndrome scales, and T scores ≥ 60 for the broadband scales (Externalizing, Internalizing, and Total Problems). Chi square analyses examined rates of scale elevations between groups. Rates of anxiety and depression did not differ across groups (χ^2[1,88]=0.155, p=0.69; χ^2[1, 88]=0.177, p=0.67, respectively). Rather, patients with left

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hemisphere epilepsy showed higher rates (15.4%) of risk-taking behaviors (e.g., deviance, dishonesty, and truancy) than patients with right hemisphere epilepsy (2.3%; $\chi^2[1,88]=4.66$, $p=0.03$). Further, those with left-sided focus had higher rates of externalizing problems (33%) than those with right (14%; $\chi^2[1, 88]=4.55$, $p=0.03$).
Conclusions: Contrary to our original hypothesis, depression and anxiety ratings did not differ between those with left and right hemisphere epilepsy. However, those with left hemisphere epilepsy had more parent-rated behavioral concerns.
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H.J. LOBLEIN, N. NUSSBAUM & J. TITUS. Anxiety in Pediatric Epilepsy: The Interaction Between Stigma and Seizure Severity.
Objective: Anxiety is more prevalent in youth with epilepsy when compared to heathy children or children with other chronic health conditions. Seizure related variables have been consistently examined to determine their relation to child anxiety, but results from this research is inconclusive. Evidence of the role of stigma in anxiety is sparse, but suggests a relation between anxiety and perceptions of stigma. To date there is limited research that examines how seizure related variables and psychosocial variables interact to affect anxiety in youth with epilepsy.
Participants and Methods: The study included 121 patients (52 male) with epilepsy (age 6-18 years). Epilepsy variables were collected via medical chart review. Anxiety was assessed with the BASC-2 or BASC-3. Parent perception of stigma was assessed with the Epilepsy Stigma Scale. Separate sequential multiple regression analyses were conducted controlling for gender, age, and IQ, and moderation was assessed using the Hayes PROCESS macro.
Results: Parent perception of stigma accounted for 5.6% of the variance in parented reported child anxiety, and the change in R^2 was statistically significant, F^{Change} (1, 116) = 7.153, $p=.009$. Seizure severity was not a statistically significant predictor of anxiety. However, seizure severity moderated the effect of perceived stigma on anxiety, $p=.0302$.
Conclusions: The current work demonstrates that there is a conditional effect of parent reported stigma on parent reported child anxiety at varying levels of seizure severity. At low levels of seizure severity, there was not a relation between parent perceptions of stigma and parent reported child anxiety. However, at higher levels of seizure severity, parents who reported more perceptions of stigma also reported higher levels of child anxiety. This suggests that seizure related variables provide an important context for the psychosocial variables that affect anxiety in youth with epilepsy.
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C. MONTPETIT, T.B. FAY-MCCLYMONT, B.L. BROOKS, L.E. BELLO-ESPINOSA, J. APPENDINO, M. SCANTLEBURY, K. DESCHAMPS & W.S. MACALLISTER. Psychological Functioning and Behavioral Concerns in Children with ESES.
Objective: Electrical status epilepticus in sleep (ESES) is an epileptic encephalopathy characterized by an EEG with greater than 85% spike/wave burden during slow sleep. Many children with ESES show substantial cognitive impairment with progressive decline, though some do not. Further, there are higher rates of psychopathology and behavioral problems in this group. The purpose of the current investigation is to examine psychological functioning in a sample of clinically referred children with ESES.
Participants and Methods: A retrospective record review was completed to determine the frequency and nature of psychological dysfunction in 27 children between the ages of 2.4 and 17.6 years ($n=19$ boys, $n=8$ girls, mean age at the time of assessment=8.7 years, $SD=3.3$) with ESES. Comprehensive neuropsychological assessments were completed with these children at the Alberta Children's Hospital.
Results: Psychiatric concerns and diagnoses were compiled from detailed neuropsychological reports, interview notes, parent-rated measures (BASC-2/3 and/or CBCL) and self-rated measures (BASC 2/3, CDI and/or CDI-2) for those children able to complete questionnaires. 93% were identified as having significant psychological or behavioral disturbances. Of these, nearly half (44%) experienced affective or emotional lability and 41% of children experienced high levels of anxiety. Other common challenges faced by this population were aggression (30%) and depression (22%). Furthermore, all children with a psychological disturbance presented with more than one comorbid psychological concern, with 59% having three or more problems.
Conclusions: Nearly all children with ESES present with comorbid behavioral or psychological concerns in our sample. Consequently, the assessment and treatment of psychopathology is critical in the care of children with ESES.
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C. MRAKOTSKY, D. PRILUTSKY, G. DUNN, C. WATSON, C. VU, S. EVANS, I. KOHANE & S. SNAPPER. Immune Gene Expression, Brain Structure, and Neuropsychological Function in Pediatric Crohn's Disease.
Objective: Systemic inflammatory disease of the gut can impact the brain. Structural changes in gray and white matter have been found in adults with Crohn's disease (CD). We have shown similar effects for pediatric CD, with both underlying inflammation and steroid therapy as possible culprits, however, associations between brain structure and detailed inflammatory profiles have not been studied. We aim to study immune pathways in brain development.
Participants and Methods: Sixty-one children age 10-15 years (20 CD_{Active}, 23 $CD_{Remission}$, 18 Healthy Controls) underwent one-time structural MRI, neuropsychological assessment, disease severity rating and phlebotomy for immune gene expression. Cortical thickness and volume was analyzed with Freesurfer. Immune gene expression was assayed via multiplex array (Nanostring®). Analyses -adjusted for age and sex-included regression, group comparison, and pathway analyses.
Results: Compared to controls, CD_{Active} patients showed reduced gray matter (i.e. inferior and superior parietal, supramarginal), subcortical volume (thalamus, hippocampus) and poorer memory and mood. Findings remained after controlling for steroids. We further found 337/594 differentially expressed (240 upregulated) immune genes in CD_{Active} compared to controls, as well as expression on complement (C2-4, CR1) and cytokine-cytokine receptor pathways (IL-1, Il-18, TNF). Upregulated immune genes were associated with cortical thinning, memory and mood.
Conclusions: Gray matter is reduced in active pediatric CD, particularly in posterior cortical and subcortical regions critical for cognition, emotional and pain processing, and this reduction is not explained by steroid therapy alone. We found differentially expressed immune genes and pathways in CD that play a role in inflammatory response, synaptic pruning, and recruitment of microglia. The association between immune genes, brain and behavior provides first insights in the molecular basis of brain involvement in CD, and lends support for exploring treatment targets.
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R. JALAL, A. NAIR, A. GYULAMJYAN, A. LIN, L. KUSHAN & C. BEARDEN. Neurocognitive Profile of Social Skills Impairment in Individuals with 22q11.2 Mutations.

Objective: Deletions (Del) and duplications (Dup) on the long arm of chromosome 22 are associated with social impairment and elevated rates of psychosis and autism. Previous literature has found that individuals with 22qDel perform poorly on social cognition tasks compared to their typically developing peers (McCabe et al., 2013; Kuhlthau et al., 2010). However, differential profiles in social cognition in 22qDel vs Dup, and respective relationships between social cognition and intellectual ability in 22q11.2 disorders has yet to be examined.

Participants and Methods: 122 individuals with 22q11.2 mutations (*M*=15.2; Del-94; Dup-28) and 74 healthy controls (*M*=13.7) were administered the WASI-II (Wechsler, 2011) to obtain IQ estimates. Social impairment was assessed using objective behavioral measures of social skills (TASIT; McDonald et al., 2003) and parent report of social functioning relative to peers (SRS-2; Constantino, 2012). One-way ANOVAs were used to look at group differences in age, IQ, and TASIT subscores. Pearson's correlations were used to assess associations between TASIT scores, IQ, and SRS-2 ratings.

Results: Results indicate relative to controls, individuals with 22q11.2 mutations scored lower on all TASIT subscores ($p<.001$). For the 22q11.2 group, there were positive correlations between IQ scores (especially Verbal IQ) and performance on the TASIT. Further analysis revealed that these correlations between TASIT subscores and IQ were mostly driven by those with 22qDup. For 22qDel, higher parent reported SRS-2 Autistic Mannerism scores were correlated with lower performance on TASIT subscores.

Conclusions: Findings suggest that IQ and verbal skills may play a mediating role in social deficits in the 22qDup group. On the contrary, for the 22qDel group stereotyped mannerisms may be more indicative of poor social cognition. These findings have significant implications for elucidating the neurocognitive profiles of each 22q11.2 subgroup and developing targeted interventions for their social cognition deficits.

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Paper Session 23. Assessment

Moderator: Brigid Waldron-Perrine

10:45 a.m.–12:15 p.m.

D. RIVERA, J. RASERO, J.M. CORTES & J.C. ARANGO-LASPRILLA. Examining the impact of the violation of normality assumptions via a Bayesian graphical model.

Objective: To examine the impact of normality assumptions on the assessment of complex network interactions using neuropsychological data.

Participants and Methods: 1642 healthy subjects from Colombia completed 9 neuropsychological tests resulting in 23 sub-scores used for analysis. A Bayesian graphical model was used to study how the results change under two different assumptions: Normality and Non-Normality of the data. In each scenario, a weighted graph was obtained whose links estimate the test interactions as conditional probabilities. A walktrap community detection algorithm yields the tests clusterization structure provided by these networks.

Results: The topology of the networks obtained change considerably depending on whether normality is assumed or not. This is translated into an overestimation or underestimation of the strength of test interactions. In general, assuming non-normality leads to more dense graphs, which can be measured by an increase in the total number of connections (the Degree). This shows how information would be lost if one assumes normality. Some test scores in the group, such as the Hopkin Verbal Learning Test-Recognition and Token Test scores (measuring comprehension and verbal memory areas), exhibit a general disconnection from the others, which we suggest it is a consequence of being strongly and inherently non-normally distributed. On the other hand, under the non-gaussian assumption, 3 subgroups are formed after clusterization. This non-normal scenario also provides rich relations between cognitive functions involved in learning and speed processing, that are not observed when normal distributions are assumed.

Conclusions: Normality is usually taken for granted in analysis of neuropsychological data. Failing to take into account normality could lead to incorrect conclusions and potentially hide valuable information about the interactions governing the different cognitive functions.

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S. DEVAUGHN, K.B. CASALETTO, A. WOLF, S.M. WALTERS, R. SALONER & J. KRAMER. Rethinking Delays: 1 Week Recall Predicts Medial Temporal Lobe Volume Decline in Healthy Older Adults.

Objective: Prior research indicates that traditional recall delays (20-30-minute) may underestimate episodic memory declines in older adults. Further, cross-sectional data suggests 1-week, but not 30-minute, delayed recall is more sensitively associated with medial temporal lobe (MTL) integrity in cognitively normal older adults (CN), consistent with neural consolidation processes. The present study assessed the *predictive* utility of baseline 1-week recall performance for trajectories of MTL integrity in CN.

Participants and Methods: 328 CN (baseline: age *M*=76.9y; education *M*=17.4y; 54.4% female; MMSE *Median*=29; CDR=0 all visits) completed the Story Recall Test (SRT) at baseline and annual brain MRIs at baseline and follow-up (visit range 1-3, *M*=1.3 visits). The SRT was orally presented until participants reached 90% recall during learning trials. Recall was tested after 30-minutes and 1-week. Gray matter volumes of the hippocampus, parahippocampal gyrus (PG), entorhinal cortex (EC), their sum as a MTL composite, and occipital lobe (control region) were examined as outcomes. Adjusting for baseline age, sex, education, and total intracranial volume, we fit mixed-effects models to assess the association of change in brain integrity with baseline recall performance.

Results: 30-minute recall did not predict any brain volume trajectories over time ($p>0.05$), whereas poorer 1-week recall predicted steeper declines in hippocampus ($p=0.01$), EC ($p=0.03$), and overall MTL ($p=0.01$). Story recall did not relate to change in PG ($p=0.17$) or occipital volumes ($p=0.70$).

Conclusions: Among functionally-intact CN, the extended delayed recall period of 1 week affords greater sensitivity to future MTL decline than performance at 30-minutes. These data highlight the predictive utility of extended delay periods in detecting neural vulnerability in CN. Results may reflect dysfunctional systemic neural re-modelling that occurs over days to weeks and may be a stronger preclinical indicator of MTL decline than poor initial synaptic consolidation.

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L. KENNEY, S.A. MARGOLIS, J. DAVIS & G. TREMONT. The Screening Utility and Ecological Validity of the Neuropsychological Assessment Battery Bill Pay Subtest in Older Adults With and Without Dementia.

Objective: The Neuropsychological Assessment Battery's Bill Pay subtest has shown strong diagnostic accuracy in Alzheimer Dementia (AD) vs. non-AD. Bill Pay's relationship to mild cognitive impairment (MCI) or all-cause dementia has not been fully examined nor has its ecological validity as a measure of financial independence.

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Participants and Methods: This retrospective chart review describes 259 women (61%) and men (age=72±8.36 years) who completed Bill Pay during outpatient neuropsychological evaluation for suspected dementia. Sixty-eight were Cognitively Normal (CN), 152 had MCI, and 39 had Dementia. Two hundred five were independent in money management, 29 were assisted (had oversight/some help), and 25 were dependent (relied on others). Receiver operating characteristic (ROC) curves tested Bill Pay's utility as a dementia screen. Kruskal Wallis examined if Bill Pay differed by level of financial independence.
Results: At a cut-off of 17, Bill Pay had strong sensitivity (0.87) and specificity (0.80) for Dementia vs. CN cases. A cut-off of 15 distinguished Dementia from both MCI and functionally unimpaired cases (MCI+CN) with equally strong specificity but weaker sensitivity (*Sn*=0.67, *Sp*=0.89 and *Sn*=0.67, *Sp*=0.84, respectively). Sensitivity attenuated even more in MCI vs. CN cases (*Sn*=0.46, *Sp*=0.84). Those who were independent in money management had higher Bill Pay scores (*Md*=18; *M*=17.10±0.44) than assisted (*Md*=17; *M*=15.38±4.35) and dependent cases (*Md*=17; *M*=15.8±3.20) (*H*'s=35.16 and 38.25, respectively; *p*'s≤0.046). Assisted and dependent cases were no different (*p*>0.05).
Conclusions: These results extend prior findings by showing that Bill Pay is a good screen of all-cause dementia. We also show that lower Bill Pay performance may mark subtle functional decline beyond cognitive impairment alone. Specifically, our results provide preliminary evidence of Bill Pay's ecological validity as a measure related to financial abilities. It may prove clinically useful when impaired financial abilities are suspected but unreported.
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J.N. IKANGA, R.F. BREIMAN, F.B. NAHAB & A.Y. STRINGER. Prediction of the Performance on a new Battery for the Assessment of Cognitive Function in Sub-Saharan Africa.
Objective: The African Neuropsychological Battery (ANB) is a culturally and linguistically appropriate measure of perception, memory, language, and executive ability for Sub-Saharan African populations. Based on prior studies with Western neuropsychological tests, we hypothesized that age, education, gender, and locale would predict cognitive performance in healthy individuals from Congo.
Participants and Methods: Subjects were 104 healthy volunteers [male/female 49/55, rural/urban=57/47, mean age=46.7 years (SD=16.5), mean education=12.5 years (SD=4.1)]. Tests were administered one-on-one, by trained technicians who performed the evaluation either in French (39), Lingala (39), or partially in both languages (26). After characterizing pattern of ANB performance using analysis of variance and t-tests, stepwise hierarchical multiple regression analyses (HMR) were used to test the hypothesized relationships between demographic variables (order of entry: age, education, gender, and locale) and cognitive performance.
Results: Performance declined with increasing age on ANB memory tests. Males performed better than females in naming and memory, and urban dwellers performed better than rural residents on nearly all tests. However, in HMR analysis, age and education combined accounted for 8-34% of variance in naming, story and visuospatial learning, list and story short delayed recall, list and visuospatial long delayed recall, face perception, and executive function. Age, education, and gender combined to account for 22-41% of variance in story and visuospatial short delayed recall and visuospatial long delayed recall. The addition of locale accounted for 23-39% of variance in visual associative learning and short delayed recall, and proverb interpretation.
Conclusions: Age and education were strong linear predictors, while gender and locale were weaker predictors after accounting for age and education. Results will guide future ANB norm development.
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S.E. MACPHERSON, N. VAN-HARSKAMP, T. SHALLICE, E. CHAN & L. CIPOLOTTI. The Cognitive Estimation Test: Bizarreness and Frontal Executive Dysfunction in Neurological Patients.
Objective: The Cognitive Estimation Test (CET: Shallice & Evans, 1978; MacPherson et al., 2014) is widely used in clinical and research settings to assess the ability to produce reasonable estimates to items that individuals would not know the exact answer to (e.g., "How fast do race horses run?"). Successful CET performance is considered to rely upon processes such as reasoning, the development and application of appropriate strategies, response plausibility checking as well as general knowledge and numeracy. Despite its wide clinical use, it is less clear whether the CET impairment reported in different neurological patients is due to frontal executive dysfunction.
Participants and Methods: One hundred and ninety-six neurological patients and 184 healthy controls were assessed on the CET (MacPherson et al., 2017). Patients were divided into: stroke; brain tumour; epilepsy/brain injury; neurodegenerative or neuropsychiatric groups. The subgroups' overall CET performance was compared and an error analysis in terms of estimate bizarreness was also conducted. We also investigated the influence of age, education, literacy attainment (NART IQ), naming and executive abilities (fluency and Stroop) on CET performance.
Results: Our results demonstrated that all patient groups generated significantly poorer cognitive estimates compared to healthy controls except the neuropsychiatric group. In addition, while the percentage of *extreme* and *very extreme* responses were significantly higher in patients, there was no difference in *quite extreme* responses. We then fitted multiple linear regression models for each error type and found that naming and fluency predicted *extreme* and *very extreme* responses, with Stroop performance also significantly contributing to the variance for *very extreme* responses. None of the predictors were significant for *quite extreme* responses.
Conclusions: Our findings suggest that *extreme* and *very extreme* CET responses represent a selective measure of frontal executive impairment while less extreme responses do not.
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Symposium 16. Prospects in the Development of Neuropsychology: Perspectives From Five Different Continents-

Chair and Presenter: Alberto L. Fernandez

Presenters: Skye McDonald, Aparna Dutt, Sharon Truter, Jonathan Evans

10:45 a.m.–12:15 p.m.

J. EVANS & A.L. FERNANDEZ. Prospects in the Development of Neuropsychology: Perspectives from Five Different Continents - International Liaison Committee Sponsored Symposium.
Objective: To generally describe the current state of development of neuropsychology across the five different continents.
Participants and Methods: a neuropsychologist of each continent (Africa, Asia, Oceania, Europe and Latin America) will expose on the current state of development of the discipline considering available assets, present state of neuropsychological research and services. Besides, a perspective of the different paths ahead for the development

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of neuropsychology in every continent will be sketched considering also what the neuropsychology of every continent can learn from each other.
Results: the present state of development varies significantly across the continents. The current state of development is conditioned by demographic and linguistic elements as well as financial resources among others.
Conclusions: Neuropsychology develops in every society according to the different demands of its context. Accordingly, its development runs through different paths in the different continents. The most developed neuropsychology in some regions can serve as a model for the development of the less developed regions. Likewise, the contexts where neuropsychology is less developed can provide information for the global development of the discipline such as influence of low education, diversity of languages and influence of particular cultural variables.
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S. MCDONALD. Prospects in The Development of Neuropsychology: Perspectives From Oceania.

Objective: to examine the challenges facing neuropsychology in the Oceania region which encompasses mainly small island nations with diverse cultures. Australia is the largest country (24 million), followed by Papua New Guinea (8 million), New Zealand (4 million), Fiji, Samoa, Tonga, Vanuato and others each with around 100 to 200,000 people.
Methods: A literature review was conducted to consider the kinds of needs different countries in Oceana have with respect to neuropsychological services and how these may best be met.
Results. Most Pacific island nations have no access to neuropsychology. Indeed, basic health care services are often stretched. Papua New Guinea, for example, is essentally a rural community. Only 18% of people live in urban areas. Access to health services is extremely limited with many living in remote regions where all transport is via foot. It is also one of the most culturally diverse countries in the world with 852 known languages.
Within Australia and New Zealand, neuropsychological services are well established but face particular challenges. Both countries are culturaly diverse including a rich mix of migrant cultures and first nation peoples. Availability of validly translated tests with appropriate norms is one issue. A second is the role of socio-economic disadvantage and a history of trauma in indigenous and refugee groups, that interact with cognitive performance. A further challenge is that many indigenous Australians live remotely, far away from city based services.
Conclusions: Neuropsychology needs to adapt to these challenges with brief screening instruments and tele-health delivery among other options.
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A. DUTT, F. MULLA & J. EVANS. An Open and Honest Appraisal for Future Growth of Clinical Neuropsychology Practice and Training in India and Other Asian Countries.

Objective: To examine the current status of neuropsychology, challenges faced and future directions for the growth of neuropsychology in Asian countries including India.
Method: A literature review was conducted. Information pertaining to India was additionally obtained with an online survey, personal communication and authors' experience.
Results: The development of neuropsychology in Asia, both clinical and research is variable. Despite the tremendous need for neuropsychological services in the Asian region, service demand, provisions, accessibility and the number of neuropsychologists is disproportionately low. There are some common factors that stand in the way of the growth of neuropsychological services in Asia. These include lack of awareness of neuropsychological disorders, lack of relevant knowledge and clinical skills training for neuropsychological assessment and rehabilitation, limited availability of culturally and linguistically appropriate neuropsychological resources, lack of adequate understanding of sociocultural, linguistic and literacy diversity during test adaptation and assessment and poor remuneration. In India, dominance of the medical model in the management of neuropsychological disorders and lack of credibility with the medical fraternity adds to the treatment gap.
Conclusions: A paradigm shift is needed for neuropsychology in Asia to grow. It needs clear service development pathways ensuring clinical excellence through supervised internships or training programmes, training workshops and peer supervision. Greater financial support for clinical neuropsychology posts from private and government healthcare bodies, considerations for wider service delivery, including development of mobile technologies for neurorehabilitation in resource constrained regions is imperative. International cooperation is also vital to develop Asia's capacity in cross cultural neuropsychology.
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S. TRUTER. Exploring the Development of Neuropsychology in Africa through an Investigation into the Application of Neuropsychological Tests in Africa.

Objective: The African continent, consisting of over 50 countries, is home to people with numerous cultures, who collectively speak over 3000 languages (Foxcroft, 2011). With a paucity of locally developed neuropsychological tests, tests developed in Western, English-speaking countries (particularly the United States of America and the United Kingdom) have been applied in Africa. This study aims to explore the development of neuropsychology in Africa by investigating the extent to which neuropsychological tests have adapted and normative data have been collected in African countries.
Methods: This study consists of a literature search for normative data available for neuropsychological tests of Western origin, in the African context.
Results: More than 35 neuropsychological tests of Western origin were found to have been applied in African countries, with normative data collected. The African countries included: Botswana, Cameroon, South Africa, Uganda and Zambia. Some of the tests were not adapted or translated and were administered in English with English-fluent participants, some tests had the test instructions translated while the content of the test items remained the same, sometimes with slight adaptations, and some tests had both the instructions and the test items adapted and translated.
Conclusions: While it is very challenging to adapt neuropsychological tests of Western origin for countries that are so culturally and linguistically diverse, the literature search shows that many tests have been effectively applied within African population groups, either making use of adaptations and/or translations, or by testing English-fluent participants without adapting the test. While many tests have been applied, very few African countries have been involved in such application. Lessons learned from the literature search on which tests have been applied in the African context and if/how they have been adapted, will be discussed.
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J. EVANS. Prospects for the Development of Neuropsychology: Perspectives From Europe.

Objective: To examine the history and present state of neuropsychology in Europe, identifying challenges and prospects for future development.
Methods: A review was conducted to examine recent literature addressing the issues for neuropsychology as practiced in Europe.
Results: Many of the most important developments in neuropsychological theory and practice have emerged from Europe. Nevertheless, a dominant feature of current European neuropsychology is heterogeneity, in relation to service provision, training pathways, statutory regulation, availability of culturally and linguistically appropriate neuropsychological assessment tools, and the extent to which neuropsychologists

contribute to neuropsychological rehabilitation (EFPA Task Force on Clinical Neuropsychology, 2017). In relation to training, differences are stark - in some countries clinical neuropsychology is a post-doctoral specialisation of clinical psychology, whilst in others psychologists are licenced following a Bachelor's degree. Heterogeneity is an issue between countries, but also within countries. Furthermore, the neuropsychological needs of increasingly diverse populations in many European countries are not being met by current practice.
Conclusions: European neuropsychology is thriving, but faces many challenges that need to be addressed to facilitate its further development. Whilst diverse pathways to the development of competent practitioners may continue to exist, recent efforts to identify and agree core competencies could enable greater consistency of service provision and easier movement of skilled practitioners between countries. There is an urgent need to develop valid tools for the assessment of culturally and linguistically diverse populations. Neuropsychologists can, and should, make greater contributions in addressing the neuropsychological needs of under-severed populations such as those with dementia, and the wider 'public cognitive health' of European nations.
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A.L. FERNANDEZ. Past, Present and Future of Neuropsychology in Latin America.
OBJECTIVE: to examine the history, present and future challenges that neuropsychology faces in the Latin American region.
METHODS: A literature review was conducted in order to review the origins of neuropsychology in the region, but also the present and future challenges considering the state of development of neuropsychology. Latin America is a large geographical region with many countries showing a great variability.
RESULTS: the cornerstone of neuropsychology in Latin America was the foundation in the 1950's of the "Brain-cortical affections laboratory" in Uruguay. Since then, neuropsychology started its development at a different pace across the countries of the region. Currently, there is an uneven development across them with just a few in which the discipline has experienced a significant development. In many countries neuropsychology is in its initial stages. The current situation is influenced by different variables and even when the progress in the last three decades has been remarkable there are still many goals to accomplish.
In the research field there is, in general, a scarce quantitative and qualitative research production as compared to other regions. The resources for research are, in general, scarce. In the professional field there is a demand for more training opportunities, regulation of the professional practice, development/adaptation of neuropsychological test and job opportunities.
CONCLUSIONS: the future of the discipline might be influenced by: a) the answers to the needs of the population, b) the answers to the needs of the practitioners according to the possibilities in the region in terms of economic resources, c) the scientific exchange with other regions of the world, d) the adjustment of the discipline development according the cultural milieu.
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SATURDAY AFTERNOON, FEBRUARY 23, 2019

Plenary G (Kaplan Memorial Lecture) Into the Gray Zone: Assessing Residual Cognitive Function in Disorders of Consciousness

Presenter: Adrian M. Owen

12:15–1:15 p.m.

A.M. OWEN. Into the Gray Zone: Assessing Residual Cognitive Function in Disorders of Consciousness.
The thought of being 'locked in' following a brain injury or aware during general anaesthesia troubles us all because it awakens the old terror of being buried alive. But what does it mean to be awake, but entirely unable to respond and what can this tell us about consciousness itself? In this lecture, I will describe rapid technological developments in the field of neuroimaging that revealing thoughts, actions and intentions based solely on the pattern of activity that is observed in the brain. For example, I will discuss a number of new functional magnetic resonance imaging (fMRI) techniques for assessing high-level cognition and even conscious awareness, without the need for any behavioural response on the part of the participant. I will also describe a simple 'brain computer interface' that we have developed to communicate with patients who, clinically, appear to be entirely vegetative, and show how real time changes in their brain activity can be used to confirm that they are in fact conscious and aware. I will also contrast those circumstances in which imaging data can be used to infer awareness in the absence of a reliable behavioural response, with those circumstances in which it cannot. This distinction is fundamental for understanding and interpreting patterns of brain activity in various states of consciousness (including vegetative state, coma, anesthesia and sleep), and has profound implications for clinical care, diagnosis, prognosis and medical-legal decision-making after severe brain injury. It also sheds light on more basic scientific questions about how consciousness is measured and the neural representation of our own thoughts and intentions. As a result of participation, the learner will be able to (1) describe disorders of consciousness, such as coma and the vegetative state (2) list cutting-edge neuroimaging methods and (3) explain how to measure awareness in various 'normal' altered states of consciousness such as sleep and general anaesthesia.
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Kaplan Lecture Luncheon

1:15–2:15 p.m.

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