Objective: Many individuals who experienced a mild traumatic brain injury (mTBI) have persistent cognitive complaints. Traditional cognitive rehabilitation (TCR) interventions were primarily developed for severe neurological injury which has limited effectiveness in rehabilitation of active duty military personnel who have the goal of returning to full military operational status. To remain on active duty, warfighters must have sufficient mental competency to safely and effectively function in complex environments such as combat. There is need for a cognitive rehabilitation approach that addresses demands of military personnel to expedite return to duty. The Strategic Memory Advanced Reasoning Training (SMART) program is novel alternative to TCR. SMART is an evidence-based advanced reasoning protocol that enhances cognitive domains essential to military readiness (e.g., mental agility, strategic learning, problem solving, and focus) and requires less than half of the treatment time. The objective of this study was to assess the efficacy of SMART compared to TCR in terms of overall recovery as well as change in specific cognitive domains.
Participants and Methods: Participants were recruited from a military treatment facility. All patients had at least one diagnosed mTBI as well as persistent cognitive complaints. Participants completed the Rey-15 to ensure performance validity. Final sample was SMART n = 28 and SCORE n = 19. Primary dependent measure was the Global Deficit Scale (GDS). GDS was calculated from: Hopkins Verbal Learning Test-Revised (HVLT-R); Delis Kaplan Executive Functioning System Color Word (CW) and Trail Making (TM), Paced Auditory Serial Addition Test (PASAT), and the Symbol Digit Modality Test (SDMT). Demographically corrected t-scores were converted to deficit scores as follows: >40 = 0, 35-39 = 1, 30-34 = 2, 25-29 = 3, 20-24 = 4, <20 = 5. Deficit scores were averaged to calculate GDS. For each measure, Hohen's g was analyzed for effect size comparisons pre-post treatment.
Results: Average number of treatment hours was significantly lower in the SMART condition (SMART: M = 18.47 hours, SD = 2.17; TCR: M = 42.42 hours, SD = 3.79, p <.001). A repeated measures ANOVA showed a significant change on GDS post-treatment (F = 30.25, p < .001) with a large effect size (η2 = .402); however, the interventions did not differ on GDS change. Impact on cognitive domains was relatively equivalent for processing speed (SMART h = 0.67 vs TCR h = -.54) and executive function (SMART h = -0.92 vs TCR h = -.85); however, SMART had a larger impact on memory (SMART h = -0.81 vs TCR h = -.39). SMART resulted in large improvements in retention and recognition memory which were minimally impacted by TCR.
Conclusions: Both TCR and SMART had comparable effectiveness in improving cognitive impairment, though SMART was completed in less than half of the treatment time. Both interventions had large effect sizes on processing speed and executive functioning; however, SMART was more effective in improving long-term memory. Memory is an integral part of military readiness. Further investigation is required to determine the relative effectiveness of these two approaches to improving cognitive readiness of the warfighter.

Categories: Concussion/Mild TBI (Adult)
Keyword 1: concussion/ mild traumatic brain injury
Keyword 2: cognitive rehabilitation
Keyword 3: memory training
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4 TBI and Blast Disrupt Normal Relationships Between Brain Function, Cognitive Performance, and Psychiatric Symptom Severity

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Objective: Determine how characteristics of deployment mild traumatic brain injury (TBI) and blast exposure influence the relationship

https://doi.org/10.1017/S135561772300841X Published online by Cambridge University Press

between the functional brain connectome with cognitive outcomes and symptom severity.
Participants and Methods: *N* = 181 Iraq and Afghanistan combat veterans completed structured clinical interviews, cognitive testing, self-report questionnaires, and magnetoencephalography (MEG). MEG data were acquired in the resting-state with eyes open. MEG data were beamformed to identify brain regions active at rest. Functional brain connectomes representing the unique network present for a given individual were created using active brain regions identified for each participant. Network metrics describing these connectomes were calculated at the participant level. Cognitive tests included the WAIS-IV, Trail Making Test Parts A&B, and the Controlled Oral Word Association test. Due to differences in normative data across tests, raw scores were used in analyses. Symptom measures included the PTSD Checklist – 5 (PCL-5), Patient Health Questionnaire (PHQ-9), Neurobehavioral Symptoms Inventory (NSI), Quality of Life After Brain Injury (QOLIBRI), Pittsburgh Sleep Quality Index (PSQI), the Distress Tolerance Scale (DTS), and the PROMIS Pain Interference Scale (PROMIS-PI).
Results: Hierarchical linear regression analyses revealed that several network metrics were significantly related to both cognitive outcomes and symptom severity after adjusting for demographic covariates and clinical characteristics.
The relationship between Global Efficiency (GE) and cognitive outcomes was moderated by deployment TBI on the WAIS-IV Full Scale Index (FSI), Perceptual Reasoning Index (PRI), and General Ability Index (GAI). In all cases, when deployment TBI was absent, greater GE was associated with poorer cognitive scores.
The relationship between GE and symptom severity was moderated by the severity of blast exposure. Greater GE was associated with lower symptom severity at lower blast severities for the PHQ-9 and QOLIBRI A (thinking) and E (negative emotions). Moderation effects were also observed for the PSQI. In the absence of deployment TBI, greater GE was associated with better sleep quality; however, in the presence of deployment TBI, greater GE was associated with poorer sleep quality. Other connectome-outcome relationships were not consistently moderated by Deployment TBI or blast history
Conclusions: Results demonstrated relationships between several aspects the functional connectome of the brain with both cognitive outcomes and symptom severity beyond effects of common demographic and clinical variables. Moderation analyses revealed that the relationship between GE of the connectome and outcomes is frequently disrupted by deployment TBI and blast. GE is a measure of the ease of information transfer through the network. These results identified consistent relationships between GE and outcomes in the absence of deployment TBI or blast, but these relationships disappear when deployment TBI or blast are present. Participants in this study were on average 11 years post-TBI or blast exposure, suggesting these are chronic rather than acute effects. GE was significantly correlated with most symptom severity measures as well as the WAIS-IV PRI, GAI, VCI, and FSI. Future efforts to normalize the relationship between GE and outcomes following TBI may improve rehabilitation outcomes and directly affect areas of concern commonly reported by service members following TBI or blast exposure.

Categories: Acquired Brain Injury (TBI/Cerebrovascular Injury & Disease - Adult)
Keyword 1: brain injury
Keyword 2: brain function
Keyword 3: cognitive functioning
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Paper Session 14: Aging topics: section 2

3:30 - 4:55pm
Friday, 3rd February, 2023
Town & Country Ballroom C

Moderated by: Katherine Gifford

1 Detection of Cognitive Subtypes Within Cognitively Normal Older Adults Using Hierarchical Community Detection

https://doi.org/10.1017/S135561772300841X Published online by Cambridge University Press