

79 Processing Speed is Related to the General Psychopathology Factor in Youth

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Objective: There is increasing interest in examining a general psychopathology factor (p factor) in children and adolescents. In previous work, the relationship between the p factor and cognition in youth has largely focused on general intelligence (IQ) and executive functions (EF). Another cognitive construct, processing speed (PS), is dissociable from these cognitive constructs, but has received less research attention despite being related to many different mental health symptoms. This study aimed to examine the association between a latent processing speed factor and the p factor in youth.

Participants and Methods: The present sample included 795 youth, ages 11-16 from the Colorado Learning Disability Research Center (CLDRC) sample. Confirmatory factor analyses tested multiple p factor models, with the primary model being a novel second-order, multi-reporter p factor where caregivers reported on externalizing symptoms (oppositional defiant disorder and conduct disorder modules from the Diagnostic Interview for Children and Adolescents [DICA]; aggression, delinquency, and attention problems subscales from the Child Behavior Checklist; and inattentive and hyperactive/impulsive subscales from the Disruptive Behavior Rating Scale) and youth self-reported on internalizing symptoms (Child Depression Inventory, generalized anxiety module from the DICA, and withdrawn, anxious/depression, and somatic subscales from the Youth Self Report). We then tested the correlation between the p factor and a latent PS factor. The latent PS factor was composed of WISC Symbol Search, WISC Coding, Colorado Perceptual Speed Test, and Identical Pictures Test. Three secondary p factor models were examined for comparison to previous literature, including (1) a bifactor, multi-reporter model, (2) a second-order model with just caregiver-report, and (3) a bifactor model with just caregiver-report.

Results: There was a significant, negative correlation between the p factor and PS ($r = -0.42$, $p < .001$), indicating that slower processing speed is associated with higher general mental health symptoms. This finding was robust across models that used different raters (youth and caregiver-report vs. caregiver-report only) and modeling approaches (second-order vs. bifactor). This association is stronger than previously reported associations with IQ or EF in the p factor literature. Further, in this sample, we found that the association between PS and the p factor was robust to covariation for general cognition, whereas the correlation between general cognition and the p factor was fully accounted for by PS.

Conclusions: Our findings indicate that PS is related to general psychopathology symptoms, expanding the existing literature relating PS to specific, distinct disorders by showing that PS is related to what is shared across psychopathology. As cognition and psychopathology both undergo significant development across childhood and adolescence, elucidating neurodevelopmental mechanisms that relate to risk for a broad range of symptoms may be critical to informing early intervention and prevention approaches. This research points to processing speed as an important transdiagnostic construct that warrants further attention and exploration across development.

Categories: Executive Functions/Frontal Lobes

Keyword 1: information processing speed

Keyword 2: executive functions

Keyword 3: psychometrics

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80 Longitudinal Development of Response Inhibition in Adolescence and Young Adulthood and Associations with Gray Matter Architecture

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Objective: The present study explored how individual differences and development of gray matter architecture in inferior frontal gyri (IFG), anterior cingulate (ACC), and inferior parietal

lobe (IPL) relate to development of response inhibition as measured by both the Stop Signal Task (SST) and the Go/No-Go (GNG) task in a longitudinal sample of healthy adolescents and young adults. Reliability of behavioral and neural measures was also explored.

Participants and Methods: A total of 145 individuals contributed data from the second through fifth timepoints of an accelerated longitudinal study focused on adolescent brain and behavioral development at the University of Minnesota. At baseline, participants were 9 to 23 years of age and were typically-developing. Assessment waves were spaced approximately 2 years apart. Behavioral measures of response inhibition collected at each assessment included GNG Commission Errors (CE) and the SST Stop Signal Reaction Time (SSRT). Structural T1 MRI scans were collected on a Siemens 3 T Tim Trio and processed with the longitudinal Freesurfer 6.0 pipeline to yield cortical thickness (CT) and surface area values. Regions of interest based on the Desikan-Killiany-Tourville atlas included IFG regions (pars opercularis (PO) and pars triangularis (PT)), ACC and IPL. The cuneus and global brain measures were evaluated as control regions. Retest stability of all measures was calculated using the psych package in R. Mixed linear effects modeling using the lme4 R package identified whether age-based trajectories for SSRTs and GNG CEs best fit linear, quadratic, or inverse curve. Then, disaggregated between- and within-subjects effects of regional cortical architecture measures were added to longitudinal behavioral models to identify individual differences and developmental effects, respectively.

Results:

Both response inhibition metrics demonstrated fair reliability and were best fit by an inverse age trajectory. Neural measures demonstrated excellent retest stability (all ICCs > 0.834). Age-based analyses of regional CT identified heterogeneous patterns of development, including linear trajectories for ACC and inverse age trajectories for bilateral PT. Individuals with thinner left PO showed worse performance on both response inhibition tasks. SSRTs were related to individual differences in right PO thickness and surface area. A developmental pattern was observed for right PT cortical thickness, where thinning over time was related to better GNG performance. Lower surface area of the right PT was related to worse GNG performance. No individual differences or

developmental patterns were observed for the ACC, IPL, cuneus, or global metrics.

Conclusions: This study examined the adolescent development of response inhibition and its association with cortical architecture in the IFG, ACC and IPL. Separate response inhibition tasks demonstrated similar developmental patterns with steepest improvements in early adolescence and relationships with left PO thickness, but each measure had unique relationships with other IFG regions. This study indicates that a region of the IFG, the par opercularis, relates to both individual difference and developmental change in response inhibition. These patterns suggest brain-behavior association that could be further explored in functional imaging studies and that may index, in vulnerable individuals, risk for psychopathology.

Categories: Executive Functions/Frontal Lobes

Keyword 1: inhibitory control

Keyword 2: neuroimaging: structural

Keyword 3: adolescence

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81 The Relationship Between Fist-Edge-Palm Performance and Informant Related Functional Status in Elderly Veterans

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Objective: Explore the relationship between a motor programming and sequencing procedure and informant rating of patients' functional abilities, especially driving. The Fist-Edge-Palm (FEP; Luria, 1970; 1980) task has previously demonstrated merit distinguishing between healthy controls and those with neurodegenerative processes (Weiner et al., 2011). However, associations between FEP performance and informant-rated functional status, particularly driving ability, have been minimally reported. This exploratory review examined the relationship between FEP, informant-rated driving ability, overall functional impairment, and neurocognitive diagnostic severity.