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.

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Participants and Methods: 41 Veterans seen in a South-Central VA Memory Clinic between 08/2020 and 07/2022 served as participants. Neuropsychological assessment included gathering demographic information, chairside neurobehavioral examination (including FEP), cognitive testing, and collateral informant completed Functional Activities Questionnaire (FAQ). Diagnostic severity [no diagnosis, mild cognitive impairment (MCI), dementia (MNCD)] was determined based on the patient's cognitive and functional deficits as measured by neuropsychological testing and informant-rated functional deficits. Correlational analyses were conducted to examine the strength of possible relationships between FEP performance, diagnostic severity, informant-rated functional status including driving impairment. Linear regression analyses determined the extent to which diagnostic severity and FEP performance predict informant-reported driving and ADL impairments
Results: Participants were 97.5% male, 78% white, 22% black. Diagnostically, 3 patients received no diagnoses, 14 with MCI, and 24 with MNCD. Spearman rank correlations were computed; FEP performance was moderately negatively correlated with diagnostic severity [rho = -.35; $p < .05$] and driving impairment [rho = -.31; $p < .05$]. Diagnostic severity was moderately positively correlated with driving [rho= .44; $p < .05$] and total functional [rho = .65; $p < .05$] impairment. Total functional impairment positively correlated with reported driving impairment [rho = .58; $p < .05$]. Simple linear regressions tested if FEP performance and diagnostic severity independently predicted informant-reported driving and functional impairment. FEP performance predicted diagnostic severity ($R2 = .12$, $p < .05$) and reported driving impairment severity ($R2 = .10$, $p < .05$) but did not predict total functional impairment severity ($R2 = .06$, $p = .14$). Diagnostic severity predicted both informant-reported driving impairment severity ($R2 = .16$, $p < .05$) and functional severity ($R2 = .30$, $p < .05$). Multiple regression tested if diagnostic severity and FEP performance together was more predictive of driving and functional impairment than individually; the overall model was predictive of driving ($R2 = .19$, $p < .05$) and total functional ($R2 = .30$, $p < .05$) impairment, but only diagnostic severity significantly predicted reported driving ($B = .63$, $p < .05$) and functional ($B = 6.25$, $p < .05$) impairments.
Conclusions: FEP performance was associated with diagnosis and collateral informant concerns of patient driving ability but not statistically related to overall functional impairment or nondriving related ADLs. FEP demonstrates utility in identification of patients demonstrating concerning driving fitness per collateral informants and diagnostic severity due to rapidity of administration, ease of instructing providers, and implementation in a wide variety of clinical settings when a caregiver or informant may not be available. Future directions include explaining the relationship between FEP and driving ability and exploring associations between FEP and other neuropsychological instruments.

Categories: Executive Functions/Frontal Lobes
Keyword 1: executive functions
Keyword 2: driving
Keyword 3: everyday functioning
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82 Examining the relationships between physiological, cognitive, and self-report indices of self-regulation

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Objective: Self-regulation is typically operationalized in neuropsychological assessment through self-report scales and measures of attention and executive functioning. However, there have been mixed findings on the relationships between self-report measures and physiological and performance-based measures believed to represent self-regulation. Poorer self-regulation is related to an array of negative behavioral and health-related outcomes. Therefore, it is critical to understand the process of self-regulation and the relationships between measures neuropsychologists use to assess it. The current study aims to investigate the relationships between four purported measures of self-regulation: resting-state high-frequency heart rate variability (HRV; a stable individual difference variable that reflects parasympathetic capacity for adapting to changing environmental demands), behavioral performance on the Delis-Kaplan Executive Function System (D-KEFS)

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