**Title**: Validation of the NIH Toolbox Version 3 in Individuals with Autism Spectrum Disorder and Learning Disabilities

**Authors**: Jiwon Kim1, Y. Catherine Han1, Stephanie R. Young1, Elizabeth M. Dworak1, Aaron J. Kaat1, Emily H. Ho1, Erica M. LaForte1, Richard C. Gershon1

**Introduction**: The NIH Toolbox Cognition Battery (NIHTB-CB) has been widely used in diverse clinical populations (Fox et al., 2022) including among individuals with intellectual and developmental disabilities (Solomon et al., 2021; Shields et al., 2020). The NIHTB-CB was recently updated, and the application and validation of Version 3 in individuals with Autism Spectrum Disorder (ASD) and learning disabilities (LD) remains underexplored.

**Method**: Here, individuals who were diagnosed with ASD (n=23; aged M=11.42 years, SD=3.89 years) or reading-based LD (n=43; aged M=12.04 years, SD=2.61 years) were recruited to complete measures from the NIHTB-CB V3. These measures included Dimensional Change Card Sorting (DCCS), Flanker Inhibitory Control Task (Flanker), List Sorting Working Memory (LSWM), Oral Reading Recognition (ORR), Pattern Comparison Processing Speed (PC), Picture Sequence Memory (PSM), Picture Vocabulary (PV), Speeded Matching (SM), and Visual Reasoning (VR). Our analyses focus on feasibility of the tests, and group-level performance compared to the age-based normative expectations.

**Results**: Based on age-adjusted norm scores, individuals with ASD showed lower performance than the normed mean on most measures (DCCS, Flanker, LSWM, ORR, PC, PSM, PV, VR; M=72.96-94.75), which were approximately 0.5-2.7 SD below the normed mean for age-adjusted scores, with the exception of the Speeded Matching task, which was administered to individuals 3-8.5 years of age (n=8, M=100.93, SD=16.05). Compared to the age-adjusted normative score expectations, individuals with ASD also obtained lower Fluid (M=83.84, SD=16.75) and Crystallized (M=73.30, SD=30.21) composite scores. Individuals with LD showed lower but near-age-expectation performance on most measures (DCCS, Flanker, LSWM, PC, PSM, PV, SM, VR, Fluid composite; M=91.25-103.97). However, LD individuals showed particularly poor performance on the reading task (ORR; n=32, M=76.54, SD=21.80) and lower performance on the Crystallized (M=81.93, SD=21.02) age-adjusted composite score.

**Discussion:** Consistent with previous studies using earlier NIHTB-CB versions (Solomon et al., 2021; Jones et al., 2022), we found that individuals with ASD in this sample showed poorer performance on measures of inhibitory control, cognitive flexibility, working memory, episodic memory, and processing speed, indicating impairments in Fluid Cognition. They also had lower scores on reading and vocabulary tasks, resulting in reduced Crystallized scores. Our ongoing analyses will explore the relationship between symptom severity (e.g., SRS-2 scores) and performance on specific tasks and composites to assess the impact of reciprocal social impairments on cognitive outcomes. Consistent with expectations for LD, individuals with reading-based LD showed lower performance on reading tasks (ORR) but performed near the age-adjusted norm on other measures, suggesting that reading difficulties may be isolated without impairments in other domains. Our ongoing analyses will conduct comparisons of NIHTB-CB performance by clinical group with performance on external battery measures, such as the WIAT-IV Word Reading test. Finally, future work will include matched samples using typically developing children matched on all demographics.

**References:**

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Northwestern University