**Title:** Using the NIH Toolbox Cognition Battery to Characterize the Cognitive Profile of Children with Autism  

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**Introduction:** The NIH Toolbox Cognition Battery (NIH-TCB) is a clinically validated set of digital assessments for the evaluation of memory, executive function, attention, processing speed, and language. While preliminary studies have implemented this measure in Intellectual Disability (ID), Fragile X syndrome, and Down syndrome (Hessl et al., 2016), to our knowledge, it has not been tested on children with autism spectrum disorder (ASD). Children with ASD are believed to possess an altered cognitive profile compared to typically developing children, characterized by executive dysfunction in several areas, including speed of processing, attention shifting, and cognitive flexibility, as well as increased attention to detail (Kenworthy et al., 2008). With the potential to evaluate these processes in children as young as three years of age, the NIH-TCB may be useful as an integrated cognition assessment for children with autism. This study details preliminary data using the NIH-TCB to assess the cognitive domains of cognitive flexibility, processing speed, and attention in children with and without ASD.

**Method:** ASD children ages 3-17 and typically developing (TD) children matched on age are currently being recruited. This abstract details data from 28 children and adolescents with ASD (mean age = 8.5 years; SD= 3.6) and 27 TD controls (mean age = 8.0 years; SD = 3.0). TD children demonstrated a significantly higher IQ (mean IQ = 112.6; p=.01) than ASD children (mean IQ = 100.7), so this was controlled for in analysis. Children were administered an abbreviated version of the Stanford-Binet Intelligence Test, Fifth Edition (SB-5) and three NIH Toolbox Cognition assessments: 1) Flanker Inhibitory Control and Attention (Flanker); 2) Dimensional Change Card Sort (DCCS); and 3) Pattern Comparison Processing Speed (PCPS). These tasks were chosen in order to evaluate attention, cognitive flexibility, and speed of processing.

Scores on the NIH-TCB were automatically computed via the NIH Toolbox application, providing an Uncorrected Standard score for each participant based on accuracy and response time vectors. These scores were converted to Age-Corrected Standard Scores based on the participant’s date of birth and performance in comparison to those of the same age in the NIH Toolbox normative data set. For the purpose of this study, only Age-Corrected Standard Scores were included for analysis.

**Results:** Six ASD children were excluded from analysis, as they were unable to complete the assessment due to difficulties in attention or understanding the tasks. These children were all characterized by an IQ at or below the fifth percentile, although a few children with IQs in this range were able to complete the assessment. Children with ASD exhibited cognitive deficits compared to TD children, with lower Age-Corrected Standard scores for the Flanker (t(47)= -2.8 ;p = .007), DCCS (t(47)= -4.9; p < .001), and PCPS (t(47)= -2.97; p = .005 ) assessments. IQ was significantly correlated with Age-Corrected Standard score for ASD (r=.66), but not TD children (r=.21) in the DCCS task. No significant correlations were found between IQ and Age-Corrected Standard score for the Flanker or PCPS tasks in either group. When controlling for IQ on the DCCS task, significant between-group differences continued to be found in Age-Corrected Standard scores (F = 14.9; p < .001), supporting previous findings using the standard DCCS task in high-functioning autism (Faja & Dawson, 2014).

**Discussion:** These preliminary findings replicate previously observed patterns of cognition in children with ASD. Children with ASD exhibited decreased cognitive flexibility, difficulties in attention switching and inhibition, and increased speed of processing compared to TD children. Although the current sample size is small, we anticipate 150 children with ASD and 75 controls by Spring 2018. These data support the potential of the NIH-TCB as a valid, integrated tool for the assessment of cognition in children with ASD.

**References/Citations:**