**Title**: Remote Cognitive Measurement via Self-Administered Smartphone Apps for Adults with Borderline Intellectual Functioning: Preliminary Evidence of the Reliability and Validity of the Mobile Toolbox

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**Introduction**: Adults with overall cognitive ability scores between one and two standard deviations below the mean, a range often described as “borderline intellectual functioning” (BIF; Peltopuro et al., 2014; Greenspan, 2017), are typically not diagnosed with intellectual disabilities, but often experience limitations in social, employment, and academic contexts (Greenspan, 2017). In order to better serve this population, researchers need tools to collect large amounts of data from diverse samples that are validated for this population. The Mobile Toolbox offers a suite of cognitive assessment measures that can be self-administered remotely on a participant's own smartphone (Gershon et al., 2022). We examined the reliability and validity of the Mobile Toolbox in a small sample of adults with BIF who self-administered the cognitive measures remotely.

**Method**: We examined a subsample of 80 participants from the Mobile Toolbox validation study, who achieved a Total Cognition composite standard score between 70 and 85 on the NIH Toolbox Cognition Battery (NIHTB-CB). Trained examiners administered the NIH Toolbox to the participants in the lab and then participants self-administered eight Mobile Toolbox measures remotely on their own smartphones. Reliability was measured via two internal consistency metrics based on the measure paradigm: Spearman Brown split half correlations and empirical reliability. Construct validity was examined through correlations with measures of the same constructs on the NIHTB-CB.

**Results**: All 80 participants were able to self-administer and complete the measures on their personal devices remotely without study support. Reliability estimates on each of the eight measures were above acceptable cut offs (empirical reliabilities of theta scores .71 to .84; Spearman Brown split half reliabilities .87 to .97). Respective restricted range-corrected correlations with NIHTB-CB measures of the same constructs were moderate to large (.28 to .52). These findings are comparable to those found in the general population sample.

**Discussion:** A small sample of adults who earned overall cognitive ability scores in the borderline intellectual functioning range were able to reliably self-administer eight cognitive measures on their personal smartphones remotely. Scores on these measures correlated as expected with scores on well established, examiner-administered measures of similar cognitive constructs, providing evidence of construct validity in this population. We used a small convenience sample of volunteer participants, and as such, participants may have been higher functioning than the general population of adults with borderline intellectual functioning. Our preliminary findings provide the first evidence that the Mobile Toolbox may be a useful tool to collect data from adults with lower cognitive functioning, and further validation studies in larger samples are warranted.

**References:**

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