**Title**: Comparison of verbal and nonverbal cognitive abilities assessed using the KBIT-2 and SB-5 across the lifespan in Down syndrome

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**Introduction**: There is considerable variability in the cognitive abilities of individuals with Down syndrome (DS) (Karmiloff-Smith et al., 2016), yet nonverbal skills tend to be a relative strength compared to verbal skills in individuals with DS across the lifespan (Silverman, 2007). Common tests used in DS to estimate cognitive abilities or intelligence quotients (IQ) include the Kaufman Brief Intelligence Test, Second Edition (KBIT-2) and Stanford-Binet Intelligence Scales, Fifth Edition (SB-5). These measures assess both verbal and nonverbal abilities. It is not known how performance on these two IQ tests compare to one another and if relative strengths and challenges in verbal and nonverbal cognitive skills are consistently observed across the measures. Detailed understanding of performance and scores on cognitive tests is critical for informing clinical trials that utilize these scores for inclusion criteria and description of samples. The goal of the present study was to investigate IQ composite scores and also nonverbal and verbal standard/scaled scores on the KBIT-2 and SB-5 to determine the amount of variation in relative differences between overall, nonverbal, and verbal abilities depending on the cognitive test being used.

**Method**: Participants were 281 individuals with DS ranging in age from 6 to 61 years (M age = 21.85 years, SD = 13.20). Study procedures were completed at either one or two study visits depending on data collection site. All of the adults with DS over the age of 35 years were assessed for dementia and deemed to be cognitively stable. Participants completed both the KBIT-2 and SB-5 abbreviated battery IQ (ABIQ) and study partners provided demographic information. Overall IQ scores and verbal/nonverbal subdomain standard scores (SS) were examined. Difference scores were also created for the verbal/nonverbal subdomain SS (Nonverbal SS – Verbal SS). Negative values indicated higher verbal scores and positive values indicated higher nonverbal scores.

**Results**: KBIT-2 IQ composite scores ranged from 40 (floor score) to 93 (M = 47.63, SD = 10.58). SB-5 ABIQ scores ranged from 47 (floor score) to 85 (M = 49.69, SD = 6.08). Twenty-seven percent (n = 75) of participants were not at the floor on either IQ measure, 3% (n = 7) were only at the floor on the KBIT-2, 29% (n = 82) were only at the floor on the SB-5, and 41% (n = 117) were at the floor on both IQ measures. Difference scores between verbal and nonverbal subdomains were significantly correlated (*r* = .22, *p* <0.001). On the KBIT-2, 35% (n = 98) of participants had higher verbal than nonverbal SS, 39% (n = 109) had higher nonverbal than verbal SS, and 26% (n = 74) had no difference (Figure 1). On the SB-5, 17% (n = 47) of participants had higher verbal than nonverbal SS, 7% (n = 21) had higher nonverbal than verbal SS, and 74% (n = 208) had no difference.

**Discussion:** Overall IQ composite scores on the KBIT-2 and SB-5 ABIQ were similar, especially considering the slightly different range of possible scores (40 floor for KBIT-2 and 47 floor for SB-5 ABIQ). As expected, there were considerable floor effects on both KBIT-2 and SB-5 ABIQ measures, with the most pronounced floor effects on the SB-5 ABIQ. There was a similar proportion of individuals with a relative nonverbal versus verbal strength on the KBIT-2 (35 vs. 39%). In contrast, the SB-5 ABIQ generally showed no difference in nonverbal versus verbal scores due to floor effects. Deviation scoring is needed to better understand the relative nonverbal and verbal strengths for individuals with DS on the SB-5 (Sansone et al., 2014). Comparing the scoring patterns on these common IQ tests will inform research and clinical trials using the assessments for study inclusion criteria and allow researchers and clinicians to make appropriate measurement selection for their specific study or clinic needs.

**References:**

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**Figure 1.** Difference scores on the Kaufman Brief Intelligence Test, Second Edition (KBIT-2) and Stanford-Binet Intelligence Scales, Fifth Edition (SB-5). Negative values indicated higher verbal scores and positive values indicated higher nonverbal scores.

