Title: Cognitive Profile of 5 – 8 Year-Olds with Williams Syndrome As Measured By the Differential Ability Scales – II Early Years

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Introduction: The Differential Ability Scales-II (DAS-II; Elliott, 2007) measures a wide range of abilities and is specifically designed to generate a reliable profile of within-child intellectual strengths and weaknesses. In this study, we describe the full range of performance for a large sample of young children with Williams syndrome (WS) on the DAS-II Early Years Upper Battery.

Methods: The DAS-II Early Years Upper battery was administered to 158 children with genetically-confirmed classic WS deletions (78 girls, 80 boys) aged 5.02 – 8.93 years (M: 7.19, SD: 1.18). The DAS-II includes three core clusters: Verbal, Nonverbal Reasoning (NVR), and Spatial, all contributing to the General Conceptual Ability score (GCA; similar to IQ). Participants also completed the supplemental School Readiness (SR) cluster, which consists of the Early Number Concepts (ENC), Matching Letter Like Forms (MLLF), and Phonological Processing (PP) subtests. For the general population, all clusters have a mean standard score (SS) of 100 (SD: 15, range: ~30 – 170). T-scores for the SR subtests were converted into SSs.

Results: Mean GCA was 64.53 (SD: 13.35, range: 32 – 97). For the core clusters, mean SSs were: Verbal: 75.34 (SD: 15.66, range: 30 – 105), NVR: 81.51 (SD: 14.23, range: 41 – 118), and Spatial: 54.61 (SD: 14.43, range: 34 – 83). SSs at floor were rare (0% for GCA and NVR SS, 1% for Verbal SS, 15% for Spatial SS). Chronological age (CA) was significantly correlated with Spatial SS (r = .20, p = .011). Core cluster SSs were significantly positively correlated: for Verbal SS and NVR SS, r = .66; for Verbal SS and Spatial SS, r = .60; for NVR SS and Spatial SS, r = .61 (p < .01). A MANOVA was performed to assess performance across the core clusters and to evaluate sex differences. A significant effect of core cluster was detected [F(2, 155) = 370.15, p < .001, ηp^2 = .83]. No significant effect of sex (p = .09) or interaction (p = .24) was found. Pairwise comparisons revealed that Verbal SS and NVR SS were both significantly greater than Spatial SS (ps < .001) and NVR SS was significantly greater than Verbal SS (p < .001). At the individual level, the test author’s criterion for a significant difference between cluster SSs was met by 87% of children for NVR SS vs. Spatial SS (87% NVR > Spatial), 74% for Verbal SS vs. Spatial SS (73% Verbal > Spatial, 1% Spatial > Verbal), and 28% for Verbal SS vs. NVR SS (25% NVR > Verbal, 3% Verbal > NVR). The group-level modal pattern of significant differences among core clusters (NVR SS > Verbal SS > Spatial SS) was shown by 57% of the children; 8 different patterns of relations among the core clusters were found. Part-whole comparisons indicated that GCA differed significantly from Verbal SS for 75% (72% Verbal > GCA, 3% GCA > Verbal), from NVR SS for 91% (91% NVR > GCA), and from Spatial SS for 68% (66% GCA > Spatial, 2% Spatial > GCA) of the sample.

Mean SR SS was 72.14 (SD: 16.97, range: 34 – 106). CA was significantly correlated with ENC (r = -.39, p < .001) and with PP (r = .19, p = .017). SR SS was at floor for only 3% of the sample. Using a MANOVA a significant effect of subtest was detected [F(2, 155) = 52.19, p < .001, ηp^2 = .40]. No significant effect of sex (p = .85) or interaction (p = .79) was found. Pairwise comparisons revealed that PP SS (M: 83) was significantly greater than MLLF SS (M: 76), which was significantly greater than ENC SS (M: 66; p < .001). The group level modal pattern of significant differences among the SR subtest SSs (PP > MLLF > ENC) was exhibited by 39% of the children; 11 different patterns of relations among the SR subtests were found.

Discussion: For young children with WS, the modal pattern of intellectual abilities was characterized by strongest performance in nonverbal reasoning abilities, next strongest performance in verbal abilities, and considerably weaker performance in spatial abilities. The modal pattern of school readiness skills indicated strongest performance in phonological processing, next strongest performance in letter-like form-matching, and weakest performance in early numerical abilities. However, clear individual differences were identified. No sex differences were found, SDs for the core clusters were similar to those for the general population, and SSs at floor were rare. As such, the DAS-II Early Years Battery is an appropriate measure for assessing patterns of relative strengths and weaknesses in the intellectual abilities of young children with WS.

References/Citations: