**Title:** Cognitive Profile of Children with Williams Syndrome as Measured by the Differential Ability Scales-II School-Aged Battery

**Authors:** C. Holley Pitts & Carolyn B. Mervis

**Introduction:** The Differential Ability Scales-II (DAS-II; Elliott, 2007) measures a wide range of intellectual abilities and is specifically designed to identify patterns of relative strengths and weaknesses. The goal of the present study was to describe the full range of performance on the DAS-II for a large cross-sectional sample of school-aged children with Williams syndrome (WS). We considered the pattern of mean performance; differences between verbal, nonverbal reasoning, spatial, and overall intellectual abilities; and differences between working memory and processing speed abilities. Correlations between abilities and possible differences as a function of chronological age (CA) or sex were also evaluated.

**Method:** The DAS-II School-Aged battery was administered to 131 children with WS (69 girls, 62 boys) aged 9.01 – 17.98 years (M: 13.02, SD: 2.96). The DAS-II has three core clusters, Verbal, Nonverbal Reasoning (NVR), and Spatial, all of which contribute to General Conceptual Ability (GCA; similar to IQ). 127 also completed the supplemental Working Memory (WM) and Processing Speed (PS) clusters. For the general population, all clusters have a mean standard score (SS) of 100 (SD: 15, range: 30 – 170).

**Results:** Mean GCA was 63.14 (SD: 12.54, range: 37 – 96), mean Verbal SS was 70.70 (SD: 17.04, range: 31 – 106), mean NVR SS was 72.26 (SD: 13.38, range: 40 – 106), and mean Spatial SS was 55.06 (SD: 12.99, range: 32 – 86). SSs at floor were rare (from 0% for GCA and NVR SS to 7% for Spatial SS). CA was not significantly correlated with GCA or SS on any of the three core clusters (ps ≥ .14). Correlations among the core cluster SSs were large and significant: for Verbal SS and NVR SS, r = .63; for Verbal SS and Spatial SS, r = .57; and for NVR SS and Spatial SS, r = .70 (ps < .01). (For the DAS-II norming sample, correlations were .64, .55, and .67 respectively). A MANOVA was performed to assess performance across the core clusters and to evaluate sex differences. A significant main effect of cluster was detected (F(1.75, 226.01) = 146.44, p < .01, η² = .53). No significant effect of sex (p = .21) or interaction (p = .17) was detected. Pairwise comparisons revealed that, overall, Spatial SS was significantly lower than both Verbal SS (p < .01) and NVR SS (p < .01). Overall, Verbal SS and NVR SS did not differ significantly (p = .56). However, at the individual level, the test author’s criterion for a significant difference between Verbal SS and NVR SS was met by 27% of the children (16% NVR > Verbal; 11% Verbal > NVR). The group level modal pattern of relations among the core clusters [(Verbal = NVR) > Spatial] matched the finding at the individual level with 45% of the children exhibiting the modal pattern; 12 different patterns of relations among core clusters were found. Part-whole comparisons were conducted to evaluate if a cluster’s SS was significantly higher or lower than GCA. For 92% of sample, GCA significantly differed from at least one of the core clusters.

Mean WM SS was 60.53 (SD: 16.68, range: 33 – 95) and mean PS SS was 65.54 (SD: 14.59, range: 31 – 110). SSs were at floor for 0% for WM and 2% for PS. CA was not significantly correlated with either supplemental cluster (ps ≥ .06). WM and PS SSs were highly correlated (r = .60, p < .01). (For the DAS-II norming sample, r = .38.) A MANOVA was performed to compare performance across diagnostic clusters. A significant main effect of cluster was detected (F(1, 125) 12.84, p < .01, η² = .09). No significant effect of sex (p = .17) or interaction (p = .93) was detected. On average, PS SS was significantly higher than WM SS (p < .01). At the individual level, 43% evidenced a significant difference between PS SS and WM SS (30% PS > WM; 13% WM > PS). Part-whole comparisons revealed that GCA differed significantly from at least one of the diagnostic clusters for 72% of the children.

**Discussion:** For children with WS, the modal pattern of cognitive abilities was a relative weakness in spatial abilities and relative strengths in verbal and nonverbal reasoning abilities. Furthermore, a relative strength in processing speed over working memory was found. However, individual differences and a variety of different patterns of relations among the core and supplemental clusters were identified. No sex differences or relations to CA were detected. SSs at floor were very infrequent. The DAS-II is an appropriate measure for assessing patterns of strengths and weaknesses in the cognitive abilities of children with WS.

**References/Citations:**