

Cognitive Profiles in Dyslexia: Beyond Phonological Processing Deficits

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INTRO

Extant research highlights the phonological deficits inherent in dyslexia. However, given the educational impact of dyslexia, an examination of a large sample was warranted to verify the full spectrum of cognitive deficits to better inform the development of effective interventions.

METHODS

In a chart review of records from 85 learning centers between 2010 and 2019, we collected scores on the Woodcock Johnson III - Tests of Cognitive Abilities (WJ III) administered to children ages 5-18 previously diagnosed with dyslexia or specific learning disability in reading and tested < 38th percentile on a reading test ($n = 4,150$).

Using descriptive statistics, linear regression, and independent samples t tests, we generated overall cognitive profiles and examined differences by age and sex.

RESULTS

- Overall, long-term memory, working memory, and processing speed were the most deficient skills, followed by auditory processing (phonological awareness).
- Age was a significant predictor* of 4 of the 7 skills ($p < .001$) with very small effect sizes: VP, PS, AT, and AP. (Fig. 1)
- There was a significant difference* between males and females on 4 of the 7 skills ($p < .001$) with very small effect sizes: VP, PS, AT, and AP. Females scored higher on all constructs except VP. (Fig.2)

RESULTS

Figure 1. Trajectory of Cognitive Skills from Age 5-18 in Dyslexia

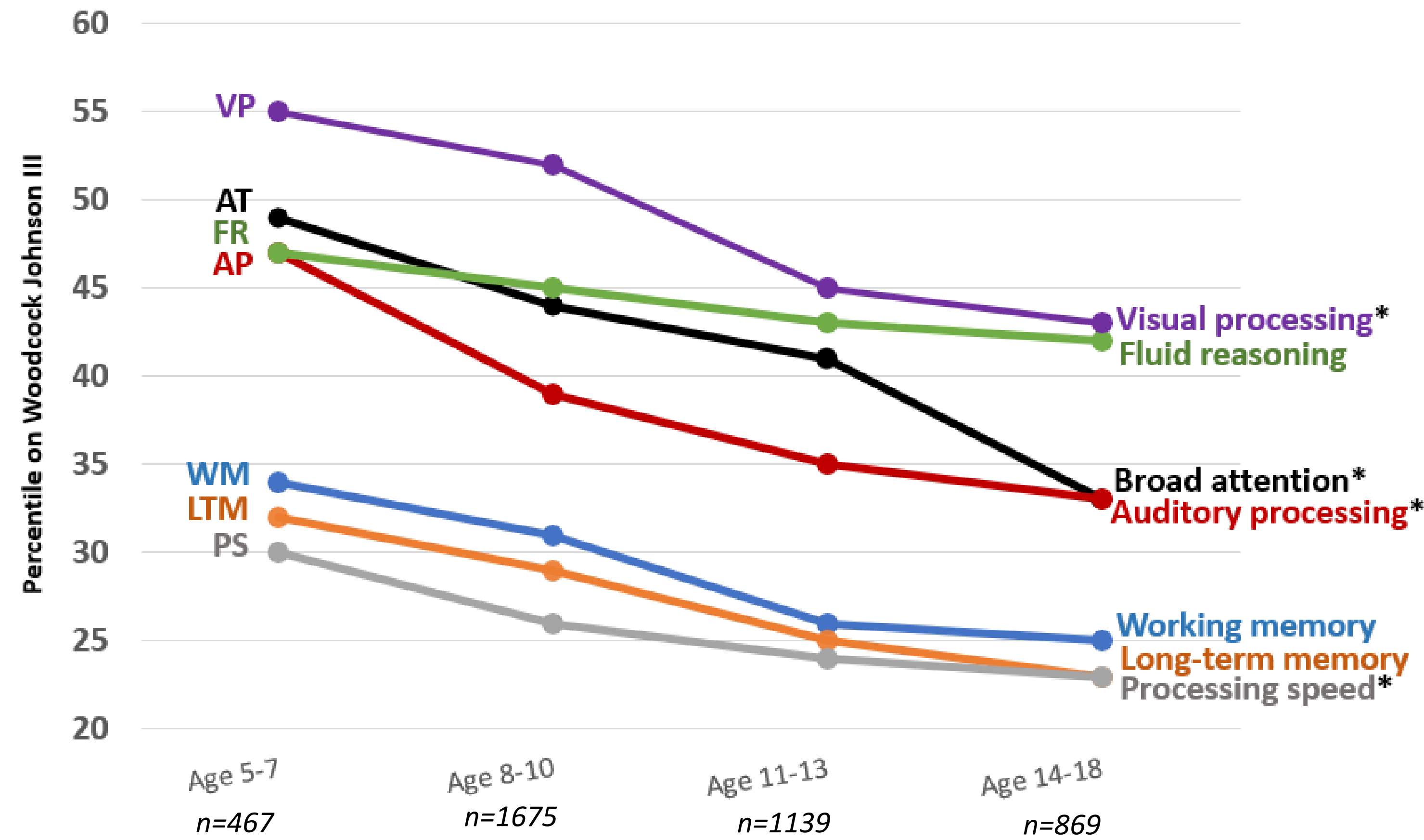
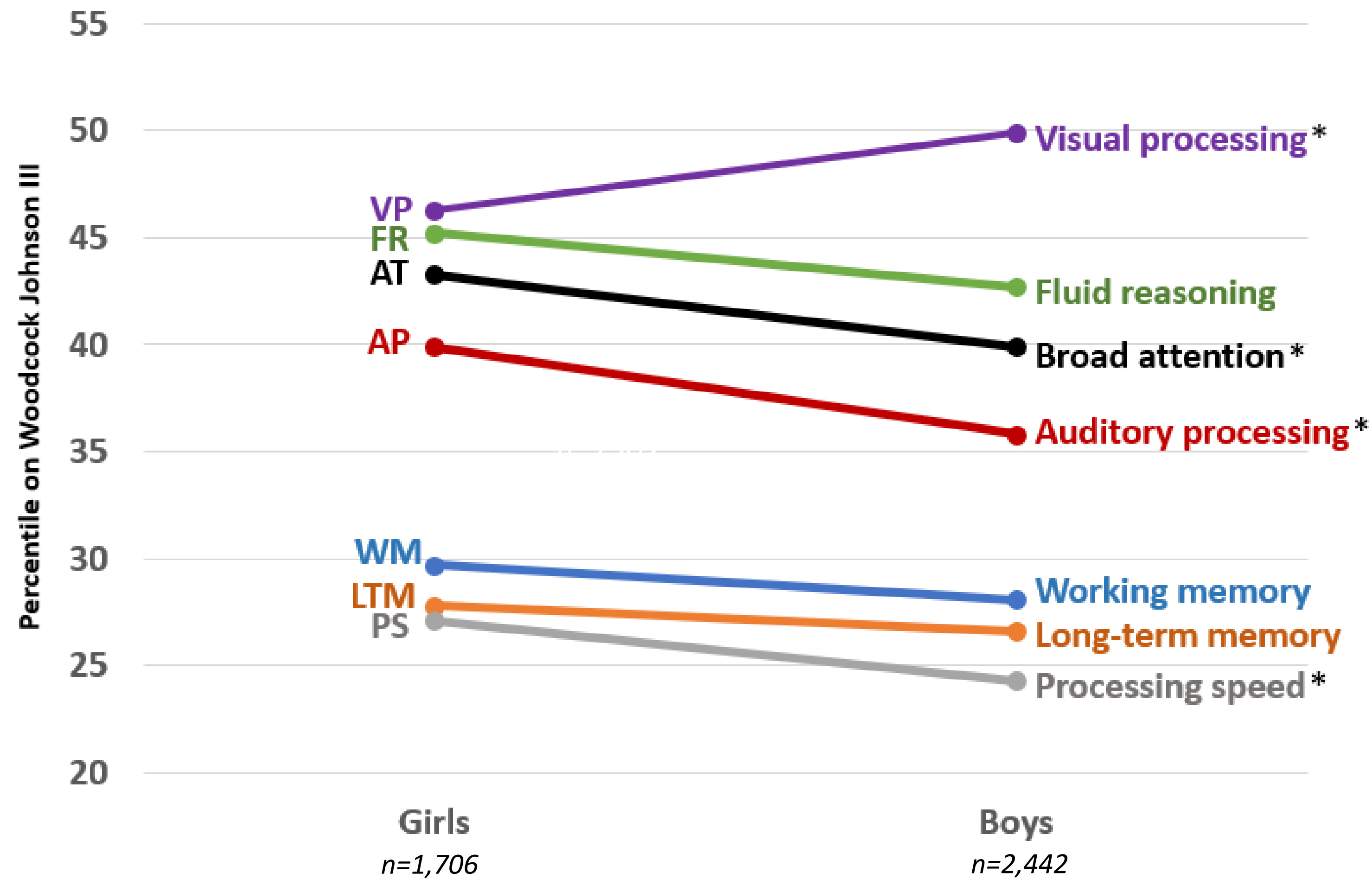


Figure 2. Sex Differences in Cognitive Profiles for Children with Dyslexia



RESULTS

Regression for Age as a Predictor:

VP ($F = 24.4, p < .001, R^2 = .006, \beta = -1.76$)
 PS ($F = 22.9, p < .001, R^2 = .006, \beta = -1.92$)
 AT ($F = 20.7, p < .001, R^2 = .005, \beta = -1.45$)
 AP ($F = 19.2, p < .001, R^2 = .005, \beta = -2.49$)
 FR ($F = 7.4, p = .007$)
 LTM ($F = .94, p = .33$)
 WM ($F = 3.1, p = .08$)

Independent T Tests for Sex Differences:

VP (Mean = 1.8, $t = 4.9, p < .001, d = .16$)
 PS (Mean = 1.9, $t = 4.8, p < .001, d = .15$)
 AT (Mean = 1.4, $t = 4.5, p < .001, d = .14$)
 AP (Mean = 2.5, $t = 4.4, p < .001, d = .13$)
 FR (Mean = 1.3, $t = 2.7, p = .007$)
 LTM (Mean = .49, $t = .97, p = .33$)
 WM (Mean = .86, $t = 1.8, p = .08$)

CONCLUSIONS

- Working memory, long-term memory, and processing speed deficits dominate cognitive profiles in dyslexia and specific learning disability in reading across age groups.
- Cognitive skills appear to decline across childhood in the absence of an effective intervention.
- Interventions for children with reading disabilities should also target multiple cognitive skill deficits.

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