Do Working Memory Deficits Underlie Reading Problems in Attention-Deficit/Hyperactivity Disorder (ADHD)?

Kofler MJ, Spiegel JA, Soto EF, Irwin LN, Wells EL, Austin KE.


Abstract

Reading problems are common in children with ADHD and show strong covariation with these children’s underdeveloped working memory abilities. In contrast, working memory training does not appear to improve reading performance for children with ADHD or neurotypical children. The current study bridges the gap between these conflicting findings, and combines dual-task methodology with Bayesian modeling to examine the role of working memory for explaining ADHD-related reading problems. Children ages 8-13 (M = 10.50, SD = 1.59) with and without ADHD (N = 78; 29 girls; 63% Caucasian/Non-Hispanic) completed a counterbalanced series of reading tasks that systematically manipulated concurrent working memory demands. Adding working memory demands produced disproportionate decrements in reading comprehension for children with ADHD (d = -0.67) relative to Non-ADHD children (d = -0.18); comprehension was significantly reduced in both groups when working memory demands were increased. These effects were robust to controls for foundational reading skills (decoding, sight word vocabulary) and comorbid reading disability. Concurrent working memory demands did not slow reading speed for either group. The ADHD group showed lower comprehension (d = 1.02) and speed (d = 0.69) even before adding working memory demands beyond those inherently required for reading. Exploratory conditional effects analyses indicated that underdeveloped working memory overlapped with 41% (comprehension) and 85% (speed) of these between-group differences. Reading problems in ADHD appear attributable, at least in part, to their underdeveloped working memory abilities. Combined with prior cross-sectional and longitudinal findings, the current experimental evidence positions working memory as a potential causal mechanism that is necessary but not sufficient for effectively understanding written language.