

**Title:** Predicting response to reading intervention based on structural and functional brain connectivity

**Research Questions:** Reading disability (RD, sometimes called dyslexia) affects approximately 10% of otherwise typically developing children. Past studies of adults and children have demonstrated changes in the structure and function of the brain following reading intervention. However, there is significant variability in the degree to which children with reading disability respond to reading intervention. The present study aimed to examine how growth in reading skills following reading intervention is predicted by pre-intervention brain connectivity, as measured with resting-state functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI), which assessed functional and structural connectivity respectively. Resting-state fMRI examines patterns of spatially coordinated spontaneous neural activity to reveal coherent brain networks. DTI measures diffusion of water molecules in white matter to examine the microstructure of white matter tracts. Individual differences in children's reading ability have previously been associated with differences in both these types of connectivity patterns. However, it remains unclear how both these measures may relate to potential for growth in behavioural reading skills.

**Methods:** Participants were children enrolled in grades 4-6 in Southwest Ontario, Canada, identified with reading disabilities and participating in a school-based Empower Reading remediation program. The Empower program is a 110-hour small-group intervention for struggling readers that has been shown to result in significant and generalizable gains in decoding, word recognition, reading accuracy, reading rate, and reading comprehension in

children with reading disability. Prior to beginning the Empower program, all children first completed behavioural measures of reading and cognitive abilities. Children also participated in a 3 Tesla MRI scan, during which we acquired a six-minute resting-state fMRI sc