

Language to Literacy: Longitudinal Contributions of Prosodic, Syntactic, and Pragmatic Skills to Reading Development in Deaf and Hard-of-Hearing Children

Deaf and hard-of-hearing (DHH) children show significant delays in language and reading development. Prosody (speech rhythm), syntax (structure rules), and pragmatics (social communication) are core language components that develop rapidly during early childhood and are essential for reading development. Despite their importance, the interrelationships among these language domains and their longitudinal impact on reading development in DHH children remain unclear. To address this gap, this three-year longitudinal study aims to (1) investigate the interconnections between these skills in preschool-aged DHH children; (2) examine their co-development across the preschool-to-primary-school transition; and (3) determine their longitudinal contributions to reading achievement. A total of 300 Mandarin-speaking DHH children with bilateral severe-to-profound hearing loss (better-ear pure-tone average > 70 dB HL at 0.5, 1, 2, and 4 kHz) and 300 age-matched typically-developing (TD) children will be assessed annually from kindergarten year 2 (K2) through Grade 1 (G1) on prosodic (lexical tone identification, phrasal boundary, sentential intonation), syntactic (word order, morphosyntax, grammar), and pragmatic (introduction and responsiveness, nonverbal communication, social-emotional attunement, executive function, and negotiation) skills. Reading outcomes (word reading and reading comprehension) will be assessed at G1. Foundational language and cognitive abilities will be measured annually as controls. A Bayesian multigroup confirmatory factor analysis will model the interconnections between prosody, syntax, and pragmatics in K2 DHH and TD children (Objective 1), hypothesizing weaker interconnections among these domains in DHH children. A Bayesian multigroup latent growth model will estimate and compare the developmental trajectories of these domains between groups from K2 to G1 (Objective 2), anticipating slower linear growth in DHH children. A Bayesian multigroup structural equation model will examine how initial levels and growth rates in each domain predict G1 reading outcomes across groups (Objective 3), hypothesizing that predictive weights will be weaker across all domains for DHH children compared to TD peers. Theoretically, this study advances the prosody-syntax interface model and the Reading Systems Framework by clarifying the longitudinal interdependencies between prosodic, syntactic, and pragmatic skills, highlighting their critical influence on reading development under constrained auditory input conditions in DHH children. Practically, our longitudinal data will help educators identify critical developmental stages and delays in prosodic, syntactic, and pragmatic skills among DHH children, guiding targeted support during their preschool-to-primary-school transition. By integrating theoretical insights with practice, our research will inform policymakers on resource allocation for supporting language and literacy development, advocating for equitable systems to enhance DHH children's long-term academic success.