

Title: Audiovisual Multisensory Integration in Individuals with Reading and Language Impairments: A Systematic Review and Meta-Analysis

Authors: Grace Pulliam¹, Jacob I. Feldman², Yupeng Liu¹, Emily Terrebonne¹, Peter G. Abdelmessih¹, and Tiffany G. Woynaroski²⁻⁵

Introduction: Differences in sensory function have been documented for a number of neurodevelopmental disabilities, including reading disabilities (e.g., dyslexia) and language disabilities (e.g., specific language impairment, developmental language disorder; DLD). A number of prior studies have specifically measured audiovisual multisensory integration (i.e., the ability to combine inputs from the auditory and visual modalities) in these populations. The present study sought to review and quantitatively synthesize the extant literature on audiovisual multisensory integration in individuals with developmental dyslexia and DLD. The first aim of this study was to evaluate the extent to which audiovisual multisensory integration in individuals with reading and language impairments differs from their typically developing peers in the extant literature. The second aim of this study was to evaluate the extent to which audiovisual multisensory integration is associated with language and reading outcomes in these populations.

Method: To identify eligible studies, a comprehensive search strategy was devised. The primary literature search used the ProQuest and PubMed databases. Of the 12,404 abstracts screened, 116 were selected for full text review. Eligibility criteria for included reports were: (a) quantitative studies measuring audiovisual multisensory integration in (b) individuals with reading impairments or language impairments. At this time, 55 studies meet our inclusionary criteria.

Results: Data extraction is ongoing. Data will be extracted from all studies that test between-group differences or correlations of interest before the Gatlinburg Conference and will be meta-analysed. Qualitative and quantitative results will be presented.

Discussion: Although no results have been presented in the study, a recent meta-analysis of individuals with autism indicated that audiovisual integration was (a) reduced in individuals with autism relative to non-autistic peers and (b) associated with language and communication skills. We therefore expect that a similar pattern of results will be present in the populations of interest to this study. If our hypotheses are born out in the final results, results may point towards differences in audiovisual integration as a common feature in neurodevelopmental disabilities writ large as opposed to a feature specific to autism.

References:

- Feldman, J. I., Dunham, K., Cassidy, M., Wallace, M. T., Liu, Y., & Woynaroski, T. G. (2018). Audiovisual multisensory integration in individuals with autism spectrum disorder: A systematic review and meta-analysis. *Neuroscience & Biobehavioral Reviews*, *95*, 220-234. <https://doi.org/10.1016/j.neubiorev.2018.09.020>
- Hairston, W. D., Burdette, J. H., Flowers, D. L., Wood, F. B., & Wallace, M. T. (2005). Altered temporal profile of visual-auditory multisensory interactions in dyslexia. *Experimental Brain Research*, *166*(3-4), 474-480. <https://doi.org/10.1007/s00221-005-2387-6>
- Wallace, M. T., Woynaroski, T., & Stevenson, R. A. (2020). Multisensory integration as a window into orderly and disrupted cognition and communication. *Annual Reviews of Psychology*, *71*, 193-219. <https://doi.org/dck8>

¹ Vanderbilt University

² Vanderbilt University Medical Center

³ Vanderbilt Bain Institute

⁴ Frist Center for Autism & Innovation, Vanderbilt University

⁵ Vanderbilt Kennedy Center