Title: Associations between Sensory Integration and Sensory Responsiveness in Children with and Without Autism Spectrum Disorder

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Introduction: Past research in our laboratory has shown that children with autism spectrum disorder (ASD) differ in multisensory integration relative to typically developing (TD) peers. For example, in comparison to TD controls, children with ASD may show a reduced magnitude of integration for audiovisual speech (as demonstrated by reduced reporting of the McGurk effect in response to mismatched audiovisual speech cues), binding of audiovisual speech cues over an atypically wide window of time, and difficulty in perceiving speech in both visual only and matched audiovisual conditions. Work in other laboratories has demonstrated that children with ASD also show differences in their patterns of responding to sensory stimuli (i.e., sensory responsiveness) relative to TD peers. These differences may include reduced responding to sensory stimuli (i.e., hyporesponsiveness), exaggerated responding to sensory stimuli (i.e., hyperresponsiveness), or fascination with/craving of certain sensory experiences (i.e., sensory seeking). This study explored the extent to which several indices of multisensory speech perception and integration correlated with patterns of sensory responsiveness in children with ASD and TD children.

Methods: Participants were 18, 8-17 year old children with ASD and 18 TD controls matched on chronological age, sex, and IQ. To assess multisensory speech perception and integration, we utilized a psychophysical task, wherein participants were randomly presented with CV syllables (e.g., ba, ga) in auditory only, visual only, matched AV, and mismatched AV (visual ga + auditory ba; McGurk) conditions. To evaluate the effects of temporal asynchrony on binding of multisensory speech information, the timing of the mismatched auditory ba and visual ga stimuli was shifted so that the visual stimulus preceded the auditory stimulus by seven stimulus onset asynchronies (SOAs): 0 ms, 33, 66, 100, 166, 233, and 300 ms. Two parent report measures, the Sensory Experiences Questionnaire and Sensory Profile Caregiver Questionnaire, were used to measure sensory responsiveness.

Results: Several indices of multisensory speech perception/integration were associated with patterns of sensory responsiveness. Hyporesponsiveness correlated with temporal binding window size ($r = .39$), as well as accuracy in the auditory only ($r = -.35$), visual only ($r = -.48$), and matched AV ($r = -.51$) conditions. Hyperresponsiveness correlated with accuracy in the visual only ($r = -.52$) and matched AV ($r = -.36$) conditions. Sensory seeking correlated with temporal binding window size ($r = .35$) and accuracy in the auditory only ($r = -.29$), visual only ($r = -.29$), and matched AV ($r = -.43$) conditions. Effect sizes for significant correlations were generally moderate to large in magnitude. A series of regression analyses indicated that none of the aforementioned associations were moderated by group.

Discussion: This is the first study to demonstrate that differences in multisensory speech perception and integration covary with atypical patterns of sensory responsiveness. Additional work is needed to determine whether differences in multisensory speech perception temporally precede, or are causally related to, differences in sensory responsiveness, or vice versa.

References/Citations: