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Examining the Relationship between Verbal Fluency and Brain Morphometry in Boys and Girls with Autism Spectrum Disorders

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Autism spectrum disorder (ASD) is a mental health condition associated with communication deficits. Previous studies have examined the relationship between the left superior temporal gyrus and receptive language ability in children with ASD [1]. However, little is known about the neural substrates behind verbal fluency in boys and girls with ASD. Our goal is to examine the brain regions involved in verbal fluency in boys with ASD, relative to girls.

Methods: Five research institutions were involved in data collection: USC, UCLA, Seattle Children's Institute, Harvard, and Yale. The sample included 73 boys with ASD, 62 girls with ASD, 59 typically developing (TD) boys, and 48 TD girls, ages 7 to 17. Diagnosis was based on the Autism Diagnostic Interview-Revised [2] and Autism Diagnostic Observation Schedule-II [3]. Verbal fluency was defined as one's ability to formulate sentences, evaluated by the Clinical Evaluation of Language Fundamentals Scale [4]. Freesurfer[5] was used to determine gray mattervolumes for regions of interest known to be related to language: left and right thalamus, inferior frontal cortex, and superior temporal cortex. Hierarchical multiple regressions and MANOVA were performed, with sex and diagnosis as independent variables while age, pubertal status, handedness, and intracranial volume served as controls.

Results: There was a main effect of sex (p=.011) and diagnosis (p<.001) on the ability to formulate sentences. A sex by diagnosis interaction was discovered on the left inferior frontal cortex (LIFC) (p=.045), while a main effect of diagnosis was found on the right superior temporal cortex (p=.006). LIFC significantly predicted formulated sentence scores (p=.003).Conclusion: TDboysdisplayedsignificantlygreaterLIFCthanboyswithASD, indicating that afailureoflefthemisphericlateralizationforverbalfluencymaydependondiagnosis. Furthermore, theLIFCvolume, previously discoveredtoberelatedtospokensentenceswithworldknowledgeanomalies[6],mayalsobeimplicatedinexpressiveverbalfluency.

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Biography

Christina Chen is a PhD candidate in Neuroscience at the University of Southern California, Los Angeles. She has presented her research at many international scientific conferences and published peer-reviewed articles on sex differences in autism spectrum disorders. Her current interests include examining the brain structure of boys versus girls with autism exhibiting language deficits and restricted repetitive behavior.

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