Title: Resting State Language Network Differences Among Verbally Fluent Adults with Autism Spectrum Disorder

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Introduction: The adult population of individuals with autism spectrum disorder (ASD) has increased substantially over the past few decades, with an estimated 50,000 individuals with ASD transitioning to adulthood each year[1]. ASD is characterized by two categories of symptom clusters: restrictive and repetitive behaviors, and impaired social interaction. While some individuals present with impairments in both symptom clusters, individuals with ASD incontrovertibly present with persistent social communication deficits. The ability to communicate relies heavily on the development of language abilities. Most functional imagine studies of adults with ASD focus on task-based differences in the language network; however, few studies examine the network at rest. Moreover, verbally-fluent adults with ASD (heretofore referred to as VFA-ASDs) often show similar, if not equal, task performance on non-social (i.e. structural) language measures compared to typically developing individuals[2]. Despite the potential to broaden our understanding of language network variations despite equal task performance, few resting state studies focus on the language network in this population.

Methods: The present study aims to fill a gap in the current literature by examining an empirically-derived language network and its correlations with behavioral measures on a gold standard ASD diagnostic tool: the Autism Diagnostic and Observation Schedule, Second Edition (ADOS-2)[3]. We aim to elucidate resting state language networks distinctive of VFA-ASDs and typically developing controls (TDCs) using resting state fMRI (rs-fMRI); furthermore, we will investigate the resting state language network functional connectivity associations as a function of the social communication score on the ADOS-2 Module 4. We hypothesize that (1) there is a resting state language network that can be observed in both VFA-ASDs and TDCs, (2) there will be differences in this network between the two groups, and (3) there will be associations between this network and the social communication score on the ADOS-2 Module 4. We will analyze structural and functional MRIs, in conjunction with ADOS social communication scores, from 40 participants (20 VFA-ASDs, 20 TDCs) tested at Indiana University as part of the Autism Brain Imaging Data Exchange-II (ABIDE-II) to answer study questions.

Results: A direct comparison of language network connectivity between TDCs and VFA-ASDs revealed limited connectivity differences in the bilateral angular and posterior superior temporal gyri. An association between language network connectivity and ADOS-2 Module 4 Social Communication Score performance in VFA-ASDs revealed a broad series of effects, including the left medial frontal gyrus (dFG), right middle frontal gyrus (rMFG), right inferior frontal gyrus (rIFG), right lingual gyrus, and bilateral precuneus.

Discussion: Overall, VFA-ASDs and TDCs show few significant differences in overall language network connectivity. However, there is language network connectivity variance associated with performance on the ADOS-2 Mod. 4 Social/Communication score in the autism group. Notably, many regions related to language processing were associated with performance (i.e. Broca's area homologue). Our results may be influenced by the relatively homogeneous, small sample size of this study, with 20 VFA-ASDs and 20 TDCs (N=40). We can evaluate these hypotheses in a larger sample to both increase variance and better represent the broader population of verbally-fluent adults with ASD.

References:

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