

# 2021 Gatlinburg Conference Poster Submission

**Title:** Resting-state Emotional Network Differences Between Verbally Fluent Adults with Autism Spectrum Disorder.

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**Introduction:** An expansive literature describes the emotional processing deficits afflicting individuals diagnosed with autism spectrum disorder (ASD). While many studies have focused on ASD in childhood, few studies have examined the neural correlates of ASD in adulthood. Furthermore, limited research has been completed to understand emotional processing deficits specific to verbally fluent adults with ASD (VFA-ASD). Therefore, we will focus specifically on the neural network responsible for delegating emotional responses, specifically, as exhibited in verbally-fluent adults with ASD (VFA-ASD). The evaluation of differences within the negative neural network among VFA-ASD may determine why these individuals differ in behavioral and social responses. Our research objective is to further examine the emotional evaluation mechanisms within these individuals in search for any alterations. If differences do not originate within the emotional network it can be assumed that disruptions in neural circuits can be found in regions associated with some different but related cognitive process.

**Methods:** We analyze VFA-ASDs in search of the negative brain model reported by Carretié et al. (2009)<sup>1</sup>. We aim to investigate the resting state emotional network of 40 participants, twenty VFA-ASDs and twenty typically developing controls (TDCs), tested at Indiana University as part of the Autism Brain Imaging Data Exchange-II (ABIDE-II) to answer study questions. We hypothesize that (1) there is a resting state emotional network that can be observed in both VFA-ASDs and TDCs, (2) there will be differences in this network between the two groups. (3) the variance in emotional network connectivity is associated with the ADOS-2 Module 4 Social Communication score<sup>2</sup>.

**Results:** A comparison between TDC's and VFA-ASDs provided evidence of a difference in emotional neural networks between groups. Significant connectivity differences were demonstrated between the negative brain network; specifically, the bilateral inferior frontal gyri (IFG), left middle frontal gyrus (LMFG), and bilateral angular gyri (AG). Differences in connectivity were not associated with score on the ADOS-2 Module 4 Social Communication score.

**Discussion:** The observed connectivity differences suggest modified emotional neural pathways within VFA-ASDs compared to TDCs. Connectivity differences were reported within the bilateral IFG, LMFG, and bilateral AG. The LMFG participates in word production and possibly serves as an information storage space; consequently, verbally fluent adults with ASD portrayed altered connectivity within the LMFG. The angular gyrus (AG) is correlated to complex language functions, number processing and spatial cognition, memory retrieval, attention, and theory of mind. We postulate that the correlation between the angular gyrus and altered social behaviors within VFA-ASD is consistent with an irregular theory of mind. Lastly, the orbitofrontal part of the IFG, (oIFG) receives projections from the thalamus and is interconnected with the amygdala and parahippocampus. The oIFG is involved in the representation of emotion as well as reward sensitivity in decision making. Taken together, these connectivity differences suggest that the negative brain network is causing disrupted emotional processing indirectly, potentially by inappropriate modulation of emotionally salient linguistic, working memory, or reward sensitivity.

## References:

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<sup>1</sup> Carretié, L., Albert, J., López-Martín, S., & Tapia, M. (2009). Negative brain: an integrative review on the neural processes activated by unpleasant stimuli. *International Journal of Psychophysiology*, 71(1), 57-63.

<sup>2</sup> Lord, C.; Rutter, M.; DiLavore, PC.; Risi, S.; Gotham, K.; Bishop, S. *Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) Manual (Part I): Modules 1–4*. Torrance, CA: Western Psychological Services; 2012

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