Title: Attentional Biases towards Emotion in Young Children with Autism Spectrum Disorder

Authors: Jessica L. Burris, Denise S. Oleas, Susan M. Rivera

Introduction: Attentional biases towards emotion are normative in very early development, however attentional biases specifically towards threatening information that persist into adolescence and adulthood have been linked to anxiety in typically developing populations (Burris et al., 2017a; Bar-Haim et al 2007). These biases are most commonly identified using an emotional face dot probe task (DPT). The classic presentation of this task requires instruction following and a button press response; responses that would be problematic for an individual with intellectual delay; thus, the presence and development of attentional biases towards emotion as identified using the DPT in atypically developing populations, as well as the link that they may have with psychopathology in these populations is unknown.

In a recent study, we showed a group of young children with fragile X syndrome and a group of matched typically developing controls, a modified version of the DPT that was adapted for use on an eye tracker and allowed for passive viewing (Burris et al., 2017b). Fragile X syndrome (FXS) is the leading known cause of inherited intellectual disability and is associated with pronounced levels of anxiety (Hagerman, 2002). We found that children with FXS showed heightened attentional biases specifically for threat over their age-matched peers, and they lacked the normative attentional bias towards positive emotions. We hypothesize that these threat specific attentional patterns in FXS are potentially mechanistically linked to the heightened anxiety and atypical social cognition of individuals with FXS.

The current study aims to expand the use of the eye tracking version of the DPT to investigate attentional patterns towards emotion in a sample of young children with Autism Spectrum Disorder (ASD), a developmental disorder that is also marked by atypical social cognition and a high degree of anxiety symptoms. Identification of these types of biases early in life, and investigating whether they are syndrome specific, creates a unique opportunity for early intervention utilizing attention training techniques with the aim to not only decrease attention to negative stimuli, but in doing so, decrease social anxiety levels.

Method: Forty-three children with a clinical diagnosis of ASD (10 female, M Age = 49.45 months, SD Age = 11.48) were recruited as part of an ongoing clinical trial at the UC Davis MIND Institute. Each participant was shown an emotional face DPT that had been modified for use on an infrared eye tracker to allow for passive viewing (Burris et al., 2017b). Congruent trials were defined as trials in which the probe appeared on the same side of the screen as the emotional face and incongruent trials were trials in which the probe appeared on the opposite side as the emotional face. Latency to fixate on the probe, rather than latency to button press assessed in the traditional task, was measured. Bias scores were calculated by subtracting the latency to detect the probe on congruent trials from latency to detect the probe on the incongruent trials, with a positive number indicating a vigilance or bias towards the emotional stimuli, a negative number indicating an avoidance of that emotional stimuli and a score of zero indicating no bias towards the emotional stimuli.

Results: At a group level, individuals with ASD had bias scores for both angry (M = 19.80, SD = 156.57) and happy (M = 10.96, SD = 137.94) trials that were not significantly different from chance (t(42) = .83 , p =.41), (t(42) = .52 , p =.61), respectively. This sets this population apart from typically developing young children of the same age who normatively have attentional biases above chance level to both angry and happy trials on the same task.

To further explore this phenomenon, a developmental lag score was calculated for each participant to capture the difference between their chronological age and their mental age as measured by the Mullen Scales of Early Learning. This developmental lag score was significantly negatively correlated with attentional bias scores to happy trials (r(42) = -.36, p < .01), but not to angry trials, showing that individuals with ASD who are showing the highest level of intellectual impairment are showing the highest avoidance of specifically positive, approach-related emotions. No correlations existed with chronological ages.
Discussion: The attentional patterns seen in ASD were different from those seen in typically developing children or children with FXS, showing that the task is sensitive enough to measure group level differences between atypically developing populations. The patterns seen in ASD, and their link to level of intellectual impairment in this group may be related to behavioral presentations of the disorder. Clinical implications of this work will be discussed with emphasis on the potential for early attentional training intervention in the most intellectually impaired individuals with ASD.

References/Citations:

- Hagerman, R. J., & Hagerman, P. J. (Eds.). (2002). Fragile X syndrome: Diagnosis, treatment, and research. Taylor & Francis US.