

Title: Associations between Social Attention Bias, Anxiety, and Autism Symptomology across Neurodevelopmental Disorders

Authors: Kayla Smith¹, Abigail Hogan¹, Elizabeth Will¹, & Jane Roberts¹

Introduction: Children with genetic neurodevelopmental disorders such as fragile X syndrome (FXS) and Down syndrome (DS) are at an increased risk of comorbid psychiatric disorders, including anxiety and autism spectrum disorder (ASD). Given the long-term impairment associated with anxiety and ASD, early identification of behavioral risk markers is essential to early detection and intervention. Attention bias has been identified as a potential risk marker of social anxiety in typically developing (TD) children; however, attention bias is also associated with ASD and ASD-related features (Kleberg et al., 2017; Roberts et al., 2019; Waters, Bradley, & Mogg, 2014). Discerning the relationship between social attentional avoidance, anxiety, and ASD could help disentangle and elucidate the emergent signs of comorbid disorders in toddlers with neurodevelopmental disorders, leading to an earlier and more accurate diagnoses. This study aims to investigate the potential association between attentional avoidance during a social fear-inducing paradigm and symptoms of anxiety and ASD across neurodevelopmental disorders.

Method: Participants included 84 children assessed at 24 months-of-age: 36 FXS (chronological age $M = 25.15$ months, $SD = 1.47$ months), 18 DS (chronological age $M = 25.93$ months, $SD = 2.76$ months), and 30 TD controls (chronological age $M = 24.83$ months, $SD = 1.40$ months). Social fear was elicited during the Stranger Approach paradigm from the Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith & Rothbart, 1996). Attentional avoidance was defined as the proportion of time spent looking away from the stranger. Parent-reported anxiety symptom severity and shyness were assessed using the Child Behavior Checklist (CBCL) and the Early Childhood Behavior Questionnaire (ECBQ) respectively (Achenbach & Rescorla, 2001; Putnam, Garstein, & Rothbart, 2006). Social avoidance was determined using the Social Avoidance Scale (SAS; Roberts, Weisenfield, Hatton, Heath, & Kaufman, 2007). Autism symptom severity was evaluated using the Calibrated Severity Score from the Autism Diagnostic Observation Schedule (ADOS-2; Lord et al., 2012).

Results: Analysis of variance (ANOVA) indicated that groups exhibited similar patterns of attentional avoidance during the Stranger Approach paradigm, $F(2, 81) = .72, p = .491$. Parent-reported shyness was also similar across groups, $F(2, 53) = 1.93, p = .155$. Groups significantly differed in regards to parent-reported anxiety symptom severity, $F(2, 67) = 12.97, p < .001$, clinician-rated social avoidance, $F(2, 75) = 6.03, p = .004$, and ASD symptom severity, $F(2, 80) = 18.61, p < .001$. Pearson correlations were used to investigate the relationship between attentional avoidance, anxiety symptom severity, shyness, social avoidance, and ASD symptom severity. Attentional avoidance was not correlated with anxiety symptom severity, shyness, or social avoidance in any group, $ps > .249$. Attentional avoidance was correlated with ASD symptom severity for toddlers with FXS, $r = .36, p = .030$, and TD toddlers, $r = .40, p = .028$, but not for toddlers with DS, $r = .19, p = .471$.

Discussion: Results suggest that despite similar amounts of attentional avoidance across neurodevelopmental disorders, there are different associations between social attentional avoidance, anxiety, and ASD in different disorders. Increased social attentional avoidance was only correlated with increased ASD symptom severity values in toddlers with FXS, but not in toddlers with DS. Interestingly, attentional avoidance was not correlated with anxiety symptoms, despite evidence from the literature on typical development suggesting that attention bias is partially responsible for the emergence and maintenance of anxiety. This is consistent with previous research indicating that reduced eye contact with an unfamiliar person in young children with FXS is associated with more severe ASD symptomology, but not anxiety (Roberts et al., 2019).

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¹ University of South Carolina, Columbia, SC