Title: Overall Attention to a Dynamic Social Scene in Preschoolers with Fragile X Syndrome

Authors: Carla A. Wall,¹ Abigail Hogan,¹ Quan Wang,² & Jane E. Roberts¹

¹University of South Carolina, ²Yale University

Introduction: Fragile X Syndrome (FXS) is a rare genetic disorder that is the leading heritable cause of intellectual disability (ID) and the leading known genetic cause of autism spectrum disorder (ASD). Current estimates indicate that 50-75% of males with FXS meet diagnostic criteria for ASD (Harris et al., 2008). In addition, FXS often co-occurs with anxiety; 86% of males and 77% of females with FXS have an anxiety disorder (Cordeiro, Ballinger, Hagerman, & Hessl, 2011; Kaufmann et al., 2004). FXS is associated with impaired social attention and avoidant eye contact (Farzin, Rivera, & Hessl, 2009; Hall et al., 2015), and atypical looking patterns to static social information are associated with elevated ASD and anxiety symptoms in adult males with FXS (Crawford, Moss, Oliver, & Riby, 2017). However, no studies have examined attention to dynamic social information (i.e., videos) in children with FXS, and it remains unknown how attention to dynamic social information relates to symptomatology in FXS. Dynamic social scenes more closely approximate naturalistic social interactions and may provide a more generalizable measure of social attention (Crawford et al., 2017). Hence, the present study aims to investigate: 1) whether attention to dynamic social information differs in children with FXS compared to typically developing (TD) controls, and 2) how attention to dynamic social information relates to developmental ability, ASD, and anxiety symptoms in FXS and TD controls.

Method: Data were taken from a longitudinal study of children with FXS. The sample included 15 children with FXS (n males=10; M age= 61.5 months), and 18 TD (n males=15; M age = 70.84 months). Children were administered an age-appropriate measure of developmental ability, either the Mullen Scales of Early Learning (MSEL: Mullen, 1995) or the Differential Ability Scales (DAS; Elliot, 1990), and a nonverbal developmental quotient (NVDQ) was calculated for analyses. For the MSEL, this was done by dividing the average age equivalent for the nonverbal subscales (Fine Motor and Visual Reception) by chronological age. For the DAS, the Nonverbal Standard Score was used. Participants’ clinical characterization also included a measure of ASD symptoms using the Autism Diagnostic Observation Schedule (ADOS-2; Lord et al., 2000) and anxiety symptoms using the Spence Children’s Anxiety Scale (SCAS-P; Spence, Barrett, & Turner, 2003). Eye-tracking data were collected using a SR Eyelink eye-tracking system on a 20-inch monitor, with five-point calibration and validation. Stimuli consisted of a 3-minute long video depicting an adult female actress seated at a table surrounded by four mechanical toys (Chawarska, Macari, & Shic, 2012). Throughout the video, the actress engages in a variety of activities directed towards the viewer designed to elicit different looking behaviors. The percent of time looking at the screen (% Dwell Time) across the 3-minute video was computed and included in analyses. Group differences in % Dwell Time, as well as correlations between % Dwell Time and NVDQ, ADOS-2 scores, and SCAS-P scores, were investigated.

Results: The mean % Dwell Time for the TD group was 97.6% (SD = 3.9%), whereas the mean for FXS group was 96.1% (SD = 4.1%) which did not differ based on an independent samples t-test (t(31) = -1.10, p = .28). Pearson correlations conducted within each group illustrated that % Dwell Time was not related to NVDQ, ADOS-2, or SCAS-P scores for both FXS and TD children (all ps > .05).

Discussion: The present study demonstrated that young children with FXS and their TD peers both exhibit high levels of overall attention to a dynamic social scene. Furthermore, attention to a social scene did not differ between groups. This finding expands upon previous work indicating that individuals with FXS do not exhibit decreased overall dwell time to static social scenes (Crawford et al., 2017). Total looking to the scene was not correlated with other clinical measures, including NVDQ, ASD symptoms, or anxiety symptoms in either group. These findings are interesting in light of previous evidence in ASD that overall attention to social scenes is associated with greater social or cognitive impairments (Campbell, Shic, Macari, & Chawarska, 2014). The FXS phenotype is more associated with social interest and social motivation than the non-syndromic ASD phenotype, irrespective of intellectual ability (Crawford et al., 2017). Thus, it is possible that the relation between social looking and symptom severity functions differently in FXS. Notably, the children in the present study are considerably younger than other studies of social attention in FXS, suggesting that the relation between social looking and symptomology may emerge later in development. Given work that suggests that specific social contexts may elicit more nuanced atypicalities in social looking, next steps include examining attention at a more fine-grained level (e.g., across conditions and regions of interest) to further elucidate how social attention differences relate to psychosocial symptoms in children with FXS (Chawarska et al., 2012).
References/Citations:


