Title: Attention to Eye Gaze in Mothers of Children with Autism and Fragile X Syndrome

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Introduction: The behavioral expression of fragile X syndrome (FXS) overlaps with many characteristics of autism spectrum disorder (ASD). One example of this overlap is atypical attention to a social partner’s eye gaze and its resulting disruption to social interactions. Despite the shared phenotypic feature of atypical eye gaze, it is unclear if this behavior stems from divergent mechanisms across these groups. It has been hypothesized that atypical eye gaze is rooted in anxiety in FXS, and in social disinterest in ASD. However, it has been difficult teasing apart these behaviors given the complex clinical presentations of ASD and FXS (Wolff et al., 1989; Cohen et al. 1989). The study of broader phenotypes observed in unaffected relatives of individuals with ASD and FXS may help clarify questions regarding phenotypic and mechanistic convergence across syndromes, as the study of relatives allows for the examination of genetically-mediated phenotypes without the confound of comorbid intellectual disability that occurs in FXS and ASD. Subclinical features reflecting genetic liability to ASD, known as the Broad Autism Phenotype (BAP), are seen at higher rates in parents of individuals with ASD (Piven et al., 1997). Similarly, features of the BAP have been documented in mothers of individuals with FXS, who are carriers of the condition and are identified as having the FMR1 premutation (Losh et al., 2012). The present study contrasted attention to eye gaze across mothers of individuals with ASD and mothers with the FMR1 premutation, relative to neurotypical control mothers. To investigate if divergent mechanisms may exist, we also examined differential associations between attention to eye gaze and aloof personality style or social anxiety symptoms across groups.

Method: Participants included 32 mothers of children with ASD, 34 mothers with the FMR1 premutation, and 24 mothers of typically developing children. Attention to eye gaze was measured using an eye tracking paradigm which recorded the percent of time spent looking at the eye region of a face displaying either a direct or averted gaze (Weisner et al., 2009). The percent of time spent looking at the eyes is a direct measure of overt attention to eye gaze. Aloof personality style was measured on a five-point scale based in a semi-structured interview conducted as part of a modified version of the Personality Assessment Schedule (MPAS; Tyrer, 1988). Social anxiety was measured using the Leibowitz Social Anxiety Scale (Liebowitz, 1987), a self-report questionnaire.

Result: A mixed effects model was used to test the effect of group, condition (direct or averted eye gaze), and their interaction on the percent of time spent looking at the eye region of the face. A significant group-by-condition interaction was detected (F[2,87] = 2.14, p = .035); mothers of individuals with ASD and mothers of typically developing individuals looked longer at the eyes in the direct gaze condition relative to the averted gaze condition, whereas those with the FMR1 premutation failed to differentiate between direct and averted gaze conditions. Aloof personality style and its interaction with group were introduced into the model and did not predict time spent looking at the eye region (p = .860). Lastly, social anxiety and its interaction with group were introduced into the model and did not predict time spent looking at the eye region (p = .581).

Discussion: Mothers of children with ASD showed similar gaze patterns as control mothers. This finding is somewhat at odds with previous literature, which documents atypical gaze patterns in infant siblings of children with ASD as part of the BAP (Elsabbagh, 2009). However, more recent work suggests the BAP is more penetrant in unaffected male relatives (Klusek et al., 2012; Ruser et al., 2012); suggesting that the inclusion of fathers of children with ASD in future research may help clarify these divergent findings. Mothers with the FMR1 premutation exhibited atypical gaze patterns that differed from both control mothers and mothers of children with ASD. This finding suggests social attention to the eye gaze of others may emerge from divergent phenotypes across the BAP and the FMR1 premutation. Attention to the eyes was not associated with either social anxiety symptoms or aloof personality styles in any group, suggesting other mechanisms may influence attention to eye gaze.

References/Citations:
- Neural correlates of eye gaze processing in the infant broader autism phenotype. Biological psychiatry, 65(1), 31-38.


