INTRODUCTION

Distinct differences in the neural activation to faces have been documented in adults with autism spectrum disorders (ASD). Specifically, this group exhibits significantly longer latencies of the N170 component (a right-lateralized ERP component over lateral posterior regions of the scalp occurring 170ms after stimulus onset) in response to faces than those exhibited by typical controls. Adults with ASD also fail to demonstrate a right hemispheric advantage for faces. In typically developing infants, two ERP components (N290, P400) have been found to be modulated by faces in a similar manner to the adult N170. Yet little research has examined whether this is the case in infants at high risk for developing autism spectrum disorders, and even fewer studies have compared face processing in ASIBs to other groups at high genetic risk for autism, such as infants with fragile X syndrome (the leading known heritable cause of autism). The current study sought to compare early differences in face perception by typically developing (TD) infants, high-risk infant siblings of children with ASD (ASIBS), and infants with Fragile X syndrome through the recording of event-related potentials (ERPs) to objects and faces at 12 months of age.

RESULTS: N290 and P400 to Faces and Toys

The dependent measure was the mean amplitude of the N290 component. There was a main effect of trial type (F(1,88)=4.96, p < .01), as the amplitude was larger for faces than for toys, but no main effects or interactions of the group factor. Thus, the N290 amplitude was larger for faces than for toys but not different for the three groups. Using the mean amplitude of the P400 as the dependent measure, an ANOVA was conducted with group (TD, ASIB, FXS) entered as a between-subjects factor and stimulus category (face, toy) entered as a repeated factor. This revealed a significant main effect of stimulus category (F(1, 33) = 8.27, p < .01) and a marginally significant interaction between group and stimulus category (F(2, 33) = 2.79, p < .08). The P400 amplitude was the same for face and toys for the TDD group, but significantly larger for the toy stimuli than the face stimuli for the SAD and FXS groups.

Mean ERP to Faces

The TDD group had larger P400 amplitudes than the ASIB group, whereas the FXS group was similar. The P400 seemed to be larger in the two at-risk groups. This may reflect an object-based preference for processing occurring at the P400 latency. A compelling finding was that FXS children assessed at 12 months with the AOSI as showing multiple risk signs showed a larger Nc to the stranger than to the mother face, whereas both TDD and ASIB groups showed enhanced Nc response to the mother face. This could mean the early component (N290) more automatic components might not be strongly influenced by the risk factors, whereas the later component is response to processes of attention and cognitive processing.

CONCLUSIONS

The current study is the first to compare face-sensitive ERP components in FXS children. As a group these children are at high-risk for ASD outcome. We found the N290 component to be similar in typically developing, children with an older sibling diagnosed with ASD, and children with FXS/paternal deletions. There were some laterality differences in the three groups, with the TDD infants showing a left face/toy distinction, and the ASIB groups showing smaller laterality effects. The P400 seemed to be larger in the two at-risk groups. This may reflect an object-based preference for processing occurring at the P400 latency. A compelling finding was that FXS children assessed at 12 months with the AOSI as showing multiple risk signs showed a larger Nc to the stranger than to the mother face, whereas both TDD and ASIB groups showed enhanced Nc response to the mother face. This could mean the early component (N290) more automatic components might not be strongly influenced by the risk factors, whereas the later component is response to processes of attention and cognitive processing.