

**Title:** Sensory Processing and Maladaptive Behavior in Young Children with Autism Spectrum Disorder and Fragile X Syndrome with and without Comorbid Autism Spectrum Disorder

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**Introduction:** Fragile X syndrome (FXS) and non-syndromic Autism Spectrum Disorder (nsASD; ASD without specific genetic etiology) share many overlapping features with approximately 60% of children with FXS also having ASD (Hagerman, Rivera, & Hagerman, 2008). Children with FXS and nsASD are also at increased risk for a variety of other challenges, including sensory processing deficits and maladaptive behavior. Previous studies have linked sensory deficits to maladaptive behavior in those with neurodevelopmental disorders (Baranek, et al., 2018); however, this association remains vastly understudied in certain neurodevelopmental disorders such as FXS. Despite a high prevalence of sensory deficits and maladaptive behavior in these populations, little is known about how these difficulties may impact one another, particularly in those with FXS with and without comorbid ASD (FXS+ASD). This study aims to characterize sensory processing deficits in children with ASD, FXS and FXS+ASD and determine the association between sensory deficits and maladaptive behavior within each of these groups. Given the elevated prevalence of sensory deficits and maladaptive behavior in these children, examining the association between sensory response patterns and maladaptive behavior will shed light on the functional impact of these challenges in those with ASD, FXS and FXS+ASD.

**Method:** Participants included 42 young children with nsASD, 25 with FXS-only, and 27 with FXS+ASD between the ages of 23 and 69 months of age ( $M = 44.92$ ,  $SD = 11.41$ ). Clinical best estimate procedures – full case review by expert licensed psychologist – were used to determine presence of ASD in both the FXS and nsASD groups. Participants' parents completed the Sensory Experiences Questionnaire (SEQ; Baranek, 1999) as a measure of sensory processing and the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) as a measure of maladaptive behavior. Scores from the hypo-responsivity, hyper-responsivity and sensory seeking subdomains of the SEQ and from the internalizing and externalizing subdomains of the CBCL were used in analyses. The externalizing domain of the CBCL is comprised of aggression and attention subdomains while the internalizing domain includes somatic, anxious/depressed, withdrawn and emotionally reactive behavior subdomains. Group differences in sensory processing profiles were tested using analysis of variance. Next, we examined differential patterns of influence of sensory processing on externalizing (attention and aggression) and internalizing (somatic, anxious/depressed, withdrawn and emotionally reactive) subdomains within each group using bivariate correlations.

**Results:** Results indicated significant group differences on sensory processing across the hyper-responsivity, hypo-responsivity and sensory seeking subdomains of the SEQ, such that the FXS-only group was significantly lower (i.e., better processing) across all sensory domains than both the nsASD and FXS+ASD groups. Hypo-responsivity was significantly associated with internalizing and externalizing behavior in nsASD ( $r(40) = .54$ ,  $p < .001$ ;  $r(40) = .32$ ,  $p = .04$ ) and FXS-only ( $r(23) = .58$ ,  $p < .001$ ;  $r(23) = .64$ ,  $p < .001$ ) but not in FXS+ASD group ( $r(25) = .33$ ,  $p = .09$ ;  $r(25) = .11$ ,  $p = .57$ ). Hyper-responsivity was significantly associated with internalizing and externalizing behavior in nsASD ( $r(40) = .56$ ,  $p < .001$ ;  $r(40) = .42$ ,  $p = .01$ ) and with internalizing behavior in FXS-only ( $r(23) = .48$ ,  $p = .02$ ) and FXS+ASD ( $r(25) = .57$ ,  $p < .001$ ). Sensory seeking was significantly associated with internalizing behavior in all three groups ( $r_s = .39 - .50$ ,  $p_s < .05$ ) but was not associated with externalizing behavior in any group (all  $p_s > .06$ ).

**Discussion:** Findings suggest that children with nsASD and FXS+ASD experience similar levels of parent-reported elevated sensory processing deficits compared to those with FXS-only. Thus, elevated sensory impairments appear to be a shared feature across ASD independent of etiology. Findings also suggest that sensory impairments contribute to aspects of maladaptive behavior differently across groups. In the nsASD group, the associations between hyper-responsivity and internalizing and externalizing behavior as well as the association between sensory seeking and internalizing behavior provide insight into the potential impact of these particular sensory domains on maladaptive behavior. Although children with FXS+ASD experience the highest levels of hypo-responsivity, the lack of association between hypo-responsivity and maladaptive behavior indicates that hypo-responsivity may be affecting some other aspect of behavior in those with FXS+ASD. Additionally, the associations between hyper-responsivity, sensory

seeking and internalizing behavior provide insight into the potential impact of these sensory domains on withdrawn behavior in children with FXS+ASD. Furthermore, although children with FXS-only experience significantly lower levels of sensory deficits across domains, these difficulties still appear to influence areas of maladaptive behavior, particularly internalizing behavior. Although further research is required to discern the associations between sensory processing deficits and maladaptive behavior, current findings suggest that sensory interventions could have implications related to maladaptive behaviors, most notably internalizing behaviors such as withdrawn behavior.

### **References:**

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