Title: ADHD Symptomatology in Preschoolers with Fragile X or Autism

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Introduction: Attention Deficit/Hyperactivity Disorder (ADHD) is the most commonly diagnosed behavioral disorder in children, with about 11% of the general population receiving a diagnosis of ADHD. Symptoms of ADHD, such as inattention, hyperactivity and impulsivity, are present at elevated rates in children with fragile X syndrome (FXS) and autism spectrum disorder (ASD). Estimates from school-age samples suggest that 60% of children with FXS and 28-53% with ASD meet diagnostic criteria for ADHD. To our knowledge, no study has examined ADHD symptom presence or severity in preschoolers with FXS or compared the severity of ADHD symptomatology between these two high-risk groups. Previous research shows that elevated autism features are associated with increased ADHD symptoms in FXS (Sullivan et al., 2006). The ability to screen for comorbid disorders in these high-risk groups through behavioral questionnaires that have high concordance with other measures is important to aid in quicker access to intervention and to direct treatment (Osa, 2016; Kroll 2006). However, employing a measure that accurately screens for comorbid disorders in high risk populations is challenging due to the nature of overlapping symptom presentation in these groups. The present study aims to characterize ADHD symptom severity across three groups of preschool-aged children: FXS, ASD and typically developing (TD) controls.

Method: The primary focus is on comparisons of boys with FXS to TD controls; however, we include a sub-sample of boys with ASD to extend this study. Participants included 108 boys with FXS (M = 53.98 months, SD = 8.12), 86 TD boys (M = 51.38 months, SD = 11.03), and 15 boys with ASD (n = 15, M = 55.02 months, SD = 8.7). The Child Behavior Checklist 1½-5 ADHD-DSM subscale raw and t-scores (CBCL; Achenbach 1991; 2001) were used to assess the presence and severity of ADHD symptoms. Cognitive functioning was measured by the Early learning composite (ELC) on the Mullen Scales of Early Learning (MSEL; Mullen, 1989).

Results: Analyses were run in two steps with the first step focused on comparing FXS to the TD controls and the second step including the group with ASD. An independent samples t-test was run to compare group means on the t-scores scores and raw scores for the CBCL ADHD-DSM subscale for the FXS and TD groups. The proportion of children in each group whose t-scores fell in the “at-risk” range (65-69) or in the clinically significant range (>70) on the CBCL ADHD DSM subscale were calculated. In the TD group, 99% (n = 85) fell in the normal range, one fell in the at-risk range, and none fell in the clinically significant range. For the FXS group 80% fell in the normal range (n = 86), 10% (n = 11) in the at risk range, and 10% (n = 11) in the clinically significant range. For the ASD group 60% of t-scores fell in the normal range, 13% fell in the at-risk range and 27% fell in the clinically significant range.

For comparisons of FXS to TD controls, the main effect of group was significant for both t-scores (t(192) = 9.82, p < .001) and raw scores (F(192) = 11.02, p < .001). For those with MSEL scores (n = 114) two analyses of covariance (ANCOVAs) were run to obtain estimates of the effect of cognitive functioning on the group differences found in mean CBCL ADHD-DSM scores. There was no significant effect of Mullen ELC scores on either raw or t-scores (Fs < .192, ps > .662). For comparisons across the FXS, TD and ASD groups, two additional ANCOVAs were run to compare group means on the raw scores and t-scores for the CBCL ADHD DSM subscale between the ASD group and smaller subsets of FXS and TD groups matched on age. Mullen ELC scores were also included as a covariate to control for group differences in cognitive functioning. The main effect of group was significant for both the raw scores (F(2, 39) = 4.52, p = .017, η² = .492) and t-scores (F(2, 39) = 4.32, p = .020, η² = .381). There was no significant effect of Mullen ELC scores on either raw or t-scores (Fs < 3.16, ps > .31). In Bonferroni-adjusted pairwise comparisons preschool boys with ASD demonstrated significantly higher ADHD subscale raw and t-scores than TD controls (ps < .03). The FXS group did not differ from the ASD group or TD group on either raw or t-scores (ps > .48).

Discussion: These findings suggest that symptom prevalence and severity of ADHD are higher in preschoolers with FXS and ASD relative to TD peers independent of developmental level. Previous literature involving school-age children with ASD and FXS have generally reported more severe ADHD symptoms in children with FXS than in children with ASD. Our findings from a parent-report questionnaire suggest that clinically significant ADHD symptoms may be less severe during the preschool than older
developmental periods in FXS. These results illustrate that behaviors related to ADHD symptomatology may emerge later in preschool or early school-age years for children with FXS. Our findings also point to the CBCL being a useful screener in ASD and FXS for common comorbid disorders, specifically ADHD. This information is critical to direct treatment efforts and to control for ADHD symptomology in treatment trials.

References/Citations: