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Socialization functioning predicts externalizing problem behaviors in Autism Spectrum Disorder

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Abstract

Individuals with ASD often display externalizing behaviors, which have been associated with lower quality of life in adulthood. Social difficulties have been hypothesized to underlie externalizing problems among individuals with ASD (Klin & Volkmar, 2000), but this has never been tested empirically. We examined whether socialization abilities predicted externalizing problems assessed by parent report in a group of 29 individuals with ASD (age range: 7 to 16 years) and 29 TD individuals matched for IQ, age, and gender. Socialization scores accounted for 50% of the variance in externalizing behaviors among individuals with ASD, but not in TD children. These findings have implications for intervention, and suggest that targeting social difficulties might provide a better means to addressing externalizing problems.

Keywords

Autism Spectrum Disorders; Socialization; Parent Report; Externalizing Problems

Individuals with Autism Spectrum Disorder (ASD) frequently exhibit associated externalizing symptoms that are not part of the diagnostic criteria, but that tend to impede individuals' daily functioning (Lord et al., 2012; Simonoff et al., 2008). These externalizing behaviors can include hyperactivity, aggression or rule breaking that are traditionally associated with externalizing disorders such as Attention Deficit Hyperactivity Disorder, Oppositional Defiant Disorder, or, for older individuals, Conduct Disorders (APA, 2013). Within the context of ASD, these associated symptoms can include diagnosable comorbidities such as ADHD (with rates ranging from 28% to 59%; Amr et al., 2012;

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Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Written informed consent was obtained from all parents of individuals who participated and written informed assent was obtained from all of the minors who participated.

Goldstein & Schwabach, 2004; Simonoff et al., 2008) or Oppositional Defiant Disorder (with rates ranging from 23% to 28%; Amr et al., 2012; Simonoff et al., 2008) that reflect clinically significant levels of externalizing problems, but can also include externalizing behaviors that do not coalesce into a categorical diagnosis or are not severe enough to warrant a diagnosis. Externalizing behaviors that are commonly noted among individuals with an ASD include, among others, verbal or physical aggression, conduct problems such as rule breaking, and behaviors associated with hyperactivity such as interrupting others and disrupting activities (Reynolds & Kamphaus, 2004).

Children and adolescents with ASD exhibit significantly more externalizing behaviors in comparison to their same aged peers (Volker et al., 2010) across all levels of cognitive abilities. For example, in a sample of over 1000 children with ASD between the ages of 4 and 17 years, Kanne & Mazurek (2011) found that 56% of individuals demonstrated current aggression towards their caregivers, and 32% were currently being aggressive towards non-caregivers. Rates of lifetime behaviors, that is, the presence of these behaviors at any developmental time point were almost 20% higher, and none of these rates (current or lifetime) were associated with IQ, symptom severity, gender or language levels, which suggests that externalizing behaviors are relevant to the entire spectrum (Kanne & Mazurek, 2011). Importantly, the function, and origin of these behaviors in ASD, and thus their responses to treatment, likely differ from those with ADHD or ODD. Among those with ASD, externalizing behaviors have been thought of as resulting from difficulties related to social function such as misunderstanding expectations, or misinterpreting social cues (Klin & Volkmar, 2000; Volker et al., 2010) but this has not been empirically validated.

In contrast to externalizing behaviors that are more easily quantified, internalizing behaviors, which are characterized by withdrawal, depression and anxiety are internal and more difficult to observe. Individuals with autism who also have heightened internalizing and externalizing symptoms appear to have worse outcomes in adulthood that include lower quality of life, increased social isolation, inclusion in fewer leisure activities, and lower self-determination (Gerber, Baud, Giroud, & Carminati, 2008) but this notion is based on an correlations derived from an intervention study that did not directly assess this question. Higher levels of externalizing behaviors in offspring with autism have been found to predict maternal stress (Lecavalier, Leone, & Wiltz, 2006), and negatively impact facial emotion recognition (Rosen & Lerner, 2016). These findings suggest that there is a particularly important relationship between externalizing behaviors and social functioning among those with ASD that has broad impacts on family functioning and personal outcomes.

The notion that there is a relationship between externalizing symptoms and social functioning among persons with ASD seems clear both from the high levels of comorbidity of ADHD/externalizing symptoms and ASD (Macintosh & Dissanayake, 2006; Volker et al., 2010), as well as from changes from DSM-IV-TR (APA, 2000) to DSM-5 (APA, 2013), which now recognizes the possibility that ADHD and ASD can co-occur, and should be diagnosed in the same individual. What is less clear, however, is the nature of the relationship between these in ASD. Not surprisingly, individuals with ASD display higher levels of externalizing problems and lower levels of socialization and social skills in comparison to their TD peers, but these factors are often examined alongside one another,

looking at their quantity, quality and severity in relation to TD or other comparison peers (Macintosh & Dissanayake, 2006; Volker et al., 2010; Volkmar et al., 1987), with few studies examining the direct relationship between these constructs.

Although externalizing problems represent a broad category of behavior, there is evidence that among adolescents with autism and cognitive impairments, externalizing behaviors, which were defined as aggression, self-injury, odd behaviors such as fecal smearing, inappropriate sexual behavior, or running away from caregivers, moderated the relationship between communication skills and social skills. In addition, levels of externalizing behaviors independently predicted social skills (Matson et al., 2013) in this sample. However, it is also possible that among persons with autism, and more specifically among those with higher cognitive abilities, externalizing problems represent a potential consequence of social difficulties. That is, social difficulties might in fact account for a significant amount of the variance in externalizing problems among persons with ASD, a notion that has been suggested anecdotally, but that has yet to be tested empirically (Klin & Volkmar, 2000; Lord & McGee, 2001). Given this possibility, as well as calls from the National Research Council's Committee on Educational Interventions for Children with Autism (Lord & McGee, 2001) to address both core symptoms and associated symptoms of ASD in treatment and educational planning, we examine the hypothesis that functional social outcomes can *predict* levels of externalizing problems in a sample of children with an ASD and high cognitive abilities.

Methods

Participants

29 (8 female) individuals with ASD and 29 (8 female) TD individuals and their families participated in this study. Participants were recruited from the community, through local parent groups, ASD service agencies, ASD community events, local schools and word of mouth. Individuals with ASD were matched one-to-one with TD individuals on the basis of chronological age (within 12 months), Full Scale IQ (FSIQ, within one standard deviation) as measured by the Wechsler Abbreviated Scale of Intelligence, 2nd edition (WASI-2; Wechsler & Hsiao-pin, 2011), and gender. All participants provided written assent and their parents provided written consent. The experiment was approved by the University's IRB.

The average ages, FSIQ, Verbal Comprehension Index (VCI), and Perceptual Reasoning Index (PRI) standard scores of all participants are provided in Table 1. There were no significant differences between the groups on age, FSIQ, or PRI Standard Scores (all p -values $> .27$). The groups did differ in their VCI ($F(1, 56) = 6.16, p = .016$), with TD participants having higher ($M = 111.72, SD = 10.77$) verbal abilities than those with ASD ($M = 104.55, SD = 11.24$).

ASD diagnoses were based on the criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (APA, 2013). Diagnoses were confirmed by research reliable clinicians who were part of the research team using the Autism Diagnostic Observation Schedule (ADOS-2; Lord et al., 2012), the Autism Diagnostic Interview-

Revised (ADI-R; Rutter, Le Couteur, Lord, & Faggioli, 2005), and clinical judgment (see Table 2 for average scores on the diagnostic measures).

Measures

The Vineland-II (Sparrow, Balla, & Cicchetti, 2005) is one of the most commonly used measures of adaptive functioning in both clinical and research settings. The Vineland-II is intended for use with individuals between birth and 90 years of age (Sparrow et al., 2005). The parent/caregiver rating form of the Vineland-II, which is a parent report rating scale (Sparrow et al., 2005), was used to assess the social functioning of participants. Because the focus of the study was to specifically look at social functioning outcomes, an a-priori decision was made to focus only on the Socialization Domain, which is composed three subtests: Interpersonal Relationships, Play and Leisure Time, and Coping Skills.

The BASC-2 Parent Rating Scale (Reynolds & Kamphaus, 2004) is a multidimensional behavior rating scale that covers a variety of behavioral domains. There are three versions of the BASC-2 PRS, with each version designed for a different age range. Here we used the child (6–11 years) and adolescent (12 – 21 years; Reynolds & Kamphaus, 2004) parent rating forms and focused our analysis on Externalizing Problems Index, which is made up of three subtests: Hyperactivity, Conduct Problems, and Aggression.

Procedure

This study took place at an ASD focused research lab affiliated with a large Northeastern University. The present study was part of a larger research project and utilized information obtained from the initial visit of the larger project. During the initial visit, after obtaining written parental consent and written assent from children, participants with ASD were administered the ADOS-2 (Lord et al., 2012). During this time parents of children with ASD were administered the ADI-R (Rutter et al., 2005). Following the completion of the ADI-R, all parents completed the Vineland-II (Sparrow et al., 2005) and the BASC-2 PRS (Reynolds & Kamphaus, 2004). Both the ASD and TD participants completed the WASI-2 (Wechsler & Hsiao-pin, 2011). In most cases all information was collected during the initial visit from the larger study, and this visit typically lasted about three hours. Administration of the ADI-R lasted approximately two hours for parents, and the completion of Vineland-II and the BASC-2 took roughly an hour, followed by other parent reports that were part of the larger project not reported here. For children, the administration of the ADOS-2 and the WASI-II lasted roughly an hour each. In some cases information was obtained across two visits.

Results

Descriptive Statistics

Parents of TD individuals rated their children as having significantly higher socialization abilities than did parents of individuals with ASD [$F(1,56) = 81.495, p < .001$]. More specifically, the TD individuals were rated as having significantly higher scores across all three subdomains of the Socialization domain, which included Play and Leisure Time [$F(1,56) = 46.563, p < .001$], Interpersonal Relations [$F(1,56) = 73.246, p < .001$] and Coping Skills [$F(1,56) = 43.770, p < .001$].

On the BASC-2, TD children had significantly lower scores on the Externalizing Problems Index than individuals with ASD [$F(1, 56) = 14.451, p < .001$] suggesting that parents of TD individuals reported fewer externalizing problems than parents of individuals with ASD. More specifically, the individuals with ASD were rated as having significantly higher scores on the hyperactivity [$F(1,56) = 41.208, p < .001$] and aggression subscales [$F(1,56) = 6.112, p < .016$] but not on the conduct problems subscale [$F(1,56) = .137, p < .713$] than the IQ, age and gender matched TD individuals. The means and standard deviations for each group on each measure are presented in Table 1.

Regression

A linear regression was conducted to determine if scores on the Socialization Domain of the Vineland-II accounted for a significant amount of the variance in scores on the Externalizing Problems Index of the BASC-2. For the ASD group, lower scores on the socialization domain were associated with higher scores on the Externalizing Problems Index of the BASC-2 ($\beta = -.708, p < .001$, see Figure 1) and socialization explained a significant proportion of variance (50.1%) in Externalizing Problems scores, $R^2 = .501, [F(1,27) = 27.145, p < .001]$. This was not the case for the TD group ($\beta = -.218, p = .255$), among whom socialization scores did not explain a significant proportion of the variance in externalizing problems scores ($R^2 = .048, [F(1,27) = 1.352, p = .255]$; see Figure 1). As a result of significant differences in the VCI scores between groups, the regressions were repeated while controlling for VCI, and the results remained the same. Further, there were no significant correlations between externalizing scores, socialization scores, and total or comparison severity scores on the ADOS, total scores on the ADI-R, or FSIQ, VCI or PRI standard scores on the WASI-II for the participants with an ASD.

Discussion

Individuals with ASD exhibit higher levels of both externalizing problems and more socialization difficulties in comparison to their TD peers (Amr et al., 2012; Goldstein & Schwebach, 2004; Simonoff et al., 2008). In addition to providing additional support for the presence of elevated externalizing behaviors in ASD, we find that among individuals with ASD and higher cognitive abilities, social functioning, as measured by parent report on the Vineland-II, predicted externalizing behavior as measured by the BASC-2. These preliminary findings support the notion that social difficulties might actually underlie externalizing behaviors among those on the autism spectrum (Lord & McGee, 2001; Volkmar et al., 1987). Although preliminary, these findings have important implications for intervention, but also more generally for understanding the nature and function of externalizing behaviors in ASD.

In our sample, participants with ASD did not differ from their TD peers in terms of their levels of conduct problems, but had higher levels of aggression and hyperactivity. In spite of these statistically significant differences, levels of aggression were in the normal range for the ASD participants and hyperactivity scores were only in the at-risk range for this group. This is important because it suggests that even more subtle behavior problems that do not coalesce into a diagnosable disorder appear to be related to socialization difficulties, a core

aspect of ASD, rather than inattention, willfulness, misbehavior, or impulsivity, as they are often constructed in ADHD. Our findings call into question the diagnostic validity of DSM-V's emphasis on the ability to co-morbidly diagnose ADHD among those with an ASD. It is possible, and even likely, based on the simple base rates of both disorders, that some individuals with ASD may truly also have ADHD. However, we argue that clinicians and researchers must look beyond symptom count, and focus their analyses on the function and cause of externalizing behaviors as the value added of a second diagnosis might in fact mask avenues to effective interventions. It is this important to consider that some externalizing behaviors in ASD are *a consequence* of social difficulties, rather than a separate co-occurring disorder, at least among those with an ASD and higher cognitive function.

These findings also have important clinical implications in relation to interventions and treatments targeting externalizing problems. As higher levels of externalizing symptoms are associated with poor adult outcomes that include lower quality of life and increased social isolation (Gerber et al., 2008), and often impede both individual and group function in the classroom, externalizing behaviors are often the target or focus of intervention. Although externalizing behaviors may look like aggression or hyperactivity, the reasons for their presence in ASD appears to relate more to a difficulty with reading social cues, or understanding social norms than might be the case in ADHD or ODD. This would suggest that interventions that target externalizing behaviors in other populations might not work as well among those with ASD, and that targeting social functioning difficulties might lead to corollary decreases in externalizing behaviors. In support of this, an intervention study focused on social skill development (Tse, Strulovitch, Tagalakakis, Meng & Fombonne, 2007) found that post intervention, the social abilities of a group of adolescents with ASD without cognitive impairments, increased while problem behaviors that included externalizing symptoms decreased, despite not having been the direct targets of intervention.

Conclusions

The BASC-2 and the Vineland-II constitute some of the most commonly used measures across in schools and clinics and are frequently used to make decisions about treatment targets. For individuals with an ASD, clinicians would be very likely to attribute low Socialization scores on the Vineland to the core clinical characteristics of ASD, but less likely to view elevated problem behaviors on the BASC as also being a part of ASD. This has large impacts on treatment planning, which might focus directly on reducing problem behaviors such as hyperactivity or aggression. Instead, the findings from the present study suggest that increasing students with ASD's socialization abilities, might be key to decreasing externalizing behaviors. Although these claims are strong, the findings must be considered preliminary, and require corroboration from other cross-sectional studies as well as longitudinal and intervention work. The data here were collected at the same time point in a relatively small sample. Longitudinal studies would support a more causal link between socialization and externalizing behaviors, as would direct intervention studies. Furthermore, direct observation studies of externalizing behaviors in individuals with ASD would provide more information about the function of these behaviors.

There are additional limitations of this study that must be considered. First, all of the participants in this study had cognitive abilities in the normal range, and thus, the generalizability of these findings to the entire spectrum is limited. Second, the comparison group in this study was a group of typically developing children, who by their very nature would have a restricted range of scores on this task, do not allow us to address the question of whether the relationship between socialization and externalizing behaviors is unique to ASD. It is clear that children with ADHD also exhibit social difficulties (Hindshaw, 2002; Landau & Moore, 1991; McConaughy, Volpe, Antshel, Gordon, & Eiraldi, 2011), however these are often construed as secondary to the attentional and hyperactive aspects inherent to a diagnosis of ADHD. Examining the directionality of effects in those with an ADHD diagnosis, those with ASD and a group of individuals with both disorders would go a long way in understanding how externalizing and social difficulties uniquely and specifically co-occur in individuals with these different conditions. Thus, future studies should increase the heterogeneity of the ASD group, and compare other atypically developing populations to examine whether this relationship is unique to ASD.

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Figure 1. Predicting Externalizing Problems from Socialization Skills

For children with ASD scores on the Socialization Domain of the Vineland-II significantly predicted scores on the Externalizing Problems Index of the BASC-2, for TD children they did not

Table 1

Descriptive statistics

Variables	Autism spectrum disorder		Typically developing		p
	Mean	SD	Mean	SD	
Demographic and cognitive					
Age	11:7	2.9	11:8	2:10	.879
Full Scale IQ	106.97	10.95	110.17	10.99	.270
Perceptual Reasoning Index	108.38	15.45	105.97	13.09	.524
Verbal Comprehension Index	104.55	11.24	111.72	10.77	.016
BASC-2					
Hyperactivity	62.55	10.666	46.86	7.712	< .001
Aggression	54.24	11.394	48.07	7.136	.016
Conduct Problems	50.10	11.111	49.10	9.432	.713
Externalizing Problems Index	56.31	10.857	47.41	6.400	< .001
Vineland-II					
Interpersonal Relations	9.97	3.065	16.10	2.350	< .001
Play Leisure Time	10.28	3.250	15.31	2.285	< .001
Coping Skills	13.71	3.723	18.38	2.205 < .001	
Socialization Domain	79.17	15.414	110.83	10.909	< .001

Age is presented in years:months. Scores presented as Standard Scores for: Full Scale IQ, Perceptual Reasoning Index, Verbal Comprehension Index, Vineland-II Socialization Domain Score. Scores presented as T-Scores: BASC-2 (Behavior Assessment System for Children, Second Edition). Scores presented as V-scale Scores for: Vineland-II Interpersonal Relations, Play Leisure Time, Coping Skills

Table 2

ADOS-2 and ADI-R Scores.

	Mean	SD
ADOS-2		
Social affect (SA) Total	10.55	3.054
Restricted and repetitive behavior (RBR) Total	4.10	1.877
Overall Total (SA + RBR)	14.66	3.608
ADOS-2 comparison score	8.21	1.473
ADI-R		
Total A	18.48	6.247
Verbal Total B	15.19	4.780
Nonverbal Total B	8.19	4.342
Total C	6.26	2.159
Total D	2.85	1.406

ADOS-2 Autism Diagnostic Observation Schedule, Second Edition, *ADI-R* Autism Diagnostic Interview-Revised, *SD* standard deviation. All scores are presented as Standard Scores.