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The Relationship Between Social Functioning and Anxiety Symptoms in Preschoolers with Autism

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Autism

By

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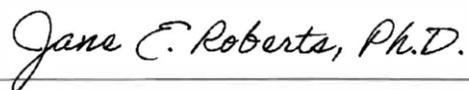South Carolina Honors College

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Thesis Summary

Autism spectrum disorder (ASD) is characterized by impairments in social functioning.

Furthermore, children with ASD have been found to have high rates of comorbid anxiety.

Understanding the relationship between ASD and comorbid anxiety is essential in raising

awareness of anxiety symptomology in children with ASD in hopes of better informing treatment

and support. The present study examines the relationship between social functioning and general

anxiety in children with ASD compared to typically developing (TD) children. The first

objective of this study was to examine group differences in social impairments and anxiety

symptoms between children diagnosed with ASD and TD children. The second objective was to

examine the relationship between the severity of social impairments to the severity of anxiety

symptoms. Participants included 46 children diagnosed with ASD and 34 TD children, ranging

from 35 to 68 months old. Social impairments were measured using the Social Responsiveness

Scale, Second Edition (SRS-2), and general anxiety was measured using the Anxiety,

Depression, and Mood Scale (ADAMS). Results from this study suggest children with ASD

display more social impairments and experience more symptoms of general anxiety.

Additionally, greater social impairments were positively correlated with greater anxiety

symptoms in both groups. The findings of this study suggest that the severity of social

impairments within ASD may exacerbate symptoms of general anxiety.

The Relationship Between Social Functioning and Anxiety Symptoms in Preschoolers with

Autism

Autism spectrum disorder (ASD), a neurodevelopmental disorder, is characterized by difficulties with social interactions, communication, and expression, as well as restricted and repeated behaviors and interests (American Psychiatric Association, 2018). Autism spectrum disorder is relatively prevalent, affecting 1 in 54 children (Maenner et al., 2020). While there is no cure, early intervention within the first three years of life and regular therapy can significantly improve a child's developmental trajectory and mitigate the severity of symptoms (CDC, 2019). Given the impairment associated with ASD, identifying early markers of impairment may allow for targeted interventions and thus improve long-term outcomes.

One particular difficulty often associated with ASD in children is impairment in social functioning. Social functioning can be defined as how a person interacts with their environment and their ability to contribute to that environment through building relationships, socializing with others, and working (Bosc, 2000). In preschool-aged children, positive social functioning may refer to a child's ability to display appropriate prosocial behaviors and reciprocal communication, as well as skills to carry out successful social adaptation and peer acceptance (Laurent, Hecht, Ensink, & Borelli, 2020). The ability of a child to respond and interact appropriately in social settings is important by allowing for successful relationship and skill building that can provide positive outcomes in future education, employment, behaviors, and health (Jones, Greenberg, & Crowley, 2015). However, social functioning is often impaired in children with ASD, as indexed by difficulty achieving joint attention or eye contact, maintaining friendships and interactions, understanding and expressing emotions, or regulating temper and behavior. Research has shown that social impairments may lead to social isolation, bullying, or

withdrawal in children with ASD, and these negative social experiences may contribute to

difficulties finding healthy coping strategies and regulating emotions (Goldsmith & Kelley,

2018). Because social impairments can have such a large impact on the lives of children with

ASD, social skill training remains at the forefront of many treatment plans, demonstrated

through therapies, such as applied behavioral analysis (ABA), and reinforced with modeling and

targeting social behaviors (Matson, Matson, & Rivet, 2007).

Although there is a large emphasis on therapies for impairments in social functioning

related to ASD symptomology, deciding on an effective course of treatment may be impacted by

a comorbid diagnosis of anxiety. An anxiety disorder involves emotional responses of excessive

worry or fear that impact aspects of daily life and the ability to function normally by resulting in

avoidance behaviors, physical changes, and significant problems in social interactions or school

(American Psychiatric Association, 2017). Children who are more susceptible to anxiety may be

so due to biological, psychological, or environmental factors such as genetic and neurobiological

vulnerability, temperament, or environment (Coltrera, 2018). These causes may explain why

children with ASD have high rates of comorbid anxiety, with a prevalence rate of approximately

40-50% (White, Oswald, Ollendick, & Scahill, 2009). The emotional and social characteristics

associated with ASD may make these children more vulnerable to anxiety, as ASD social

impairments or communication deficits and anxiety symptoms can exacerbate one another

(Grondhuis & Aman, 2012). Those ASD characteristics can have an impact on secondary

problems by causing impaired social performance and emotional distress, both relating to an

increase in anxiety (Ireri, White, & Mbwayo, 2019). A previous study of 104 infants at both high

and low familial risk for ASD were assessed up to 7 years of age for symptoms of anxiety and

ASD. Results from this study showed that children who demonstrated greater ASD symptoms

also demonstrated greater symptoms of fearfulness, shyness, and anxiety (Shephard et al., 2018). These findings suggest ASD symptomology exacerbates anxiety symptomology.

Because of the large impact ASD symptomology has on social functioning, these social impairments should be specifically considered when observing the link between ASD and anxiety. Previous studies of children with autism diagnoses found that when children displayed or reported symptoms of anxiety, such as unhappiness or aggressiveness, they also showed more severe ASD social impairments, such as avoiding contact with others (Factor, Ryan, Farley, Ollendick, & Scarpa, 2017; Shirian & Dera, 2015). Anxiety symptoms may relate to these sociability problems as children on the autism spectrum may internalize situations differently, contributing to anxiety, which therefore may lead to externalizing situations differently, impacting sociability (Factor et al., 2017). Understanding how anxiety and social functioning in ASD are related should be emphasized to design targeted treatment for individuals with ASD and comorbid anxiety. Previous treatment that has involved social skills intervention targeting ASD symptoms in children has been shown to have a clinically significant improvement on symptoms of anxiety (Kang, Clarkson, Keifer, Rosen, & Lerner, 2019). This suggests that ASD social impairments in particular can impact level of anxiety, and recognizing this relationship is important as the two variables may compound one another in children with ASD.

Objective

The focus of this study was to analyze the relationship between social functioning and general anxiety in preschoolers with ASD compared to typically developing (TD) children. The first objective was to compare both social impairments and symptoms of general anxiety in children with ASD to TD children. Based on the findings of previous research, it was hypothesized that the ASD group would have higher levels of both social impairments and

general anxiety in comparison to the TD group. The second objective was to examine the relationship between social impairments and general anxiety symptoms within both groups. It was hypothesized that there will be a direct relationship between social impairments and anxiety symptoms, with higher levels of social impairments associated with greater anxiety symptomology.

Method

Participants

Participants included 46 children diagnosed with ASD and 34 chronologically age-matched TD children. Participants ranged in age from 35.21 to 68.88 months. The average age of the ASD participants was 48.56 months ($SD = 5.73$), and the average age of the TD participants was 49.31 months ($SD = 8.00$). See Table 1 for descriptive statistics.

Measures

Social Responsiveness Scale. The Social Responsiveness Scale, Second Edition (SRS-2; Constantino & Gruber, 2012) is a caregiver-report questionnaire that assesses social impairments, specifically social awareness, social cognition, social communication, social motivation, and autistic mannerisms. SRS-2 Total raw scores were calculated by summing the raw scores of the five subdomains. The SRS-2 Total T-score was used as indicator of the severity of ASD symptoms by collecting data on social impairments.

General Anxiety. The Anxiety, Depression and Mood Scale (ADAMS; Esbensen et al., 2003) is a caregiver-report questionnaire that assesses a child's anxiety symptoms and includes five subdomains: manic/hyperactive behavior, depressed mood, social avoidance, general anxiety, and obsessive/compulsive behavior. This particular study focuses specifically on the domain of general anxiety, using the General Anxiety Subscale raw score.

Developmental Level. The Mullen Scales of Early Learning (MSEL; Mullen, 1995) is a developmental measure that evaluates cognitive functioning in children aged 0 to 68 months old. The Mullen Early Learning Composite (ELC) is an assessment of developmental abilities derived using the following subscales: Visual Reception, Fine Motor, Expressive Language, and Receptive Language.

Procedure

Data were collected from larger longitudinal studies at the University of South Carolina (USC) centered around early development in children with neurodevelopmental disorders, such as ASD. Participants were assessed at 36M, 48M, and 60M by at least two trained lab examiners, either in their home or at the USC Neurodevelopmental Disorders Lab in Columbia. The SRS-2, ADAMS, and MSEL were administered at each assessment as part of a larger assessment battery. Data were drawn from participants' 48M assessment. If data was not available at this time point, data were drawn from either the 36M or 60M assessment. Parents of participants gave written informed consent for research participation, and lab procedures were approved by the Institutional Review Board at the USC.

Statistical Analysis Plan

A series of one-way analyses of covariance (ANCOVAs) were performed to analyze group differences in social impairments and general anxiety for the ASD and TD groups. A one-way ANCOVA was first used to analyze group differences in SRS-2 Total T-scores, and another was used to analyze group differences on ADAMS General Anxiety raw scores. Partial correlations were then used to examine the relationship between SRS-2 Total T-scores and General Anxiety scores. Developmental abilities were controlled for using the Mullen ELC for all analyses.

Results

Differences in Social Responsiveness Between Groups

A one-way ANCOVA was performed to analyze group differences in social impairments between the two sample groups. Using SRS-2 Total *T*-score as the dependent variable, the two groups were compared, using the Mullen ELC as a control. The ANCOVA was significant for SRS-2 Total *T*-score, $F(2, 79) = 77.27$, $p < .001$. Group was a significant predictor of SRS-2 Total *T*-score, $F(1, 77) = 17.53$, $p < .001$ (See Figure 1). Mullen ELC score also significantly predicted SRS-2 Total *T*-score, $F(1, 77) = 7.79$, $b = -0.18$, $p = .007$. In other words, for every 1-point increase in ELC score, SRS-2 Total *T*-score was reduced by 0.18 points.

Differences in General Anxiety Between Groups

A one-way ANCOVA was also performed to analyze group differences on the dependent variable of general anxiety between children with ASD and TD children, controlling for Mullen ELC. The ANCOVA was significant for General Anxiety, $F(2, 79) = 30.44$, $p < .001$. Group was a significant predictor of anxiety symptoms, $F(1, 77) = 9.58$, $p = .003$ (See Figure 2). However, Mullen ELC score did not significantly predict anxiety symptoms, $F(1, 77) = 1.58$, $p = .212$.

Partial Correlation Coefficients

Partial correlation coefficients were computed to examine whether there was a statistically significant relationship between SRS-2 Total *T*-scores and General Anxiety scores within both groups, controlling for Mullen ELC. In the ASD group, SRS-2 Total *T*-scores were significantly positively correlated with General Anxiety scores, $r = .54$, $p < .001$. In the TD group, SRS-2 Total *T*-scores were also significantly positively correlated with General Anxiety scores, $r = .70$, $p < .001$ (See Figure 3).

Discussion

In this study, we aimed to analyze the relationship between social functioning and general anxiety in preschoolers with ASD compared to TD preschoolers. To investigate this relationship, impairments in social functioning, measured using the SRS-2, and general anxiety, measured using the ADAMS, were both assessed. Results indicate groups were significantly different on both variables, and a significant positive correlation emerged between the two variables within both groups.

When analyzing group differences in severity of social impairments, results showed that preschoolers with ASD exhibited significantly higher levels of social impairments than TD preschoolers. This is consistent with the hypothesis and expected as ASD is typically characterized by social impairments. Developmental level was also a significant predictor of severity of social impairments, with lower cognitive level associated with greater social impairments. These results may suggest that developmental level impacts level of social functioning. However, as children with ASD typically have lower developmental levels in comparison to TD children, group differences may underlie this association.

When analyzing group differences in severity of general anxiety, results showed that preschoolers with ASD exhibited significantly higher levels of anxiety symptoms than TD preschoolers. This is consistent with the hypothesis and aligns with previously mentioned research that found high comorbidity between ASD and anxiety diagnoses. Developmental level was not a significant predictor of severity of general anxiety symptoms, despite group differences. These results may suggest anxiety is not impacted by intellectual disability, but instead the ASD diagnosis.

Additionally, the relationship between social impairments and general anxiety was examined for both groups, revealing that greater social impairment was associated with greater general anxiety, despite group differences. This is consistent with the hypothesis and suggests that the relationship is still prevalent despite diagnosis. Although a significantly positive correlation was observed for the TD group, the TD group exhibited limited variability in SRS-2 T-scores. As TD children were screened for an ASD diagnosis, they were expected to display minimal ASD symptoms, and therefore their range in SRS-2 T-scores is more limited.

Results from this study support the hypotheses and are consistent with previous research suggesting that there is a relationship between social impairments and anxiety, especially in children with ASD. However, previous research has also shown conflicting results. Lower-functioning children with ASD show greater ASD symptoms, including communication deficits which incorporate a large portion of social impairments. Previous literature found these lower-functioning children with ASD, who demonstrated greater communication deficits, exhibited less anxiety symptoms than higher-functioning children, possibly due to their inability to understand and express emotions as a result of their ASD symptoms. (Davis et al., 2012). The present study attempts to address this conflicting data by controlling for developmental abilities and cognitive levels that may contribute to difficulties in understanding. Nonetheless, the findings in the present study and this limited, contrasting previous literature suggest that further studies on ASD and anxiety diagnoses are necessary in order to fully understand the relationship between ASD social functioning and anxiety symptoms.

Altogether, these findings indicate social impairments are associated with general anxiety symptoms in preschool-aged children with ASD. These findings are relevant because social functioning is important in children, specifically those with ASD, and could lead to changes in

brain activity, impacting emotional regulation and therefore symptoms of anxiety (Guy, Sounders, Bradstreet, Delussey, & Herrington, 2014). Results from the present study and previous literature suggest that there are mediating factors, such as emotional regulatory ability, that underlie the relationship between social functioning and general anxiety. This impact of social functioning on emotion regulation has been analyzed in several studies of children with ASD and provides a possible explanation for why ASD social impairments may exacerbate the emotion of anxiety. To counterbalance this argument, one could justify that there is some overlapping symptomology between autism and anxiety diagnoses, specifically in terms of social interactions and avoidance, which may be driving this correlation. However, the correlation in this study between social functioning and anxiety symptoms is particular because it not only presented in children with ASD, but also in TD children, suggesting that the relationship is not limited to diagnosis, and instead focuses on general social impairments.

Due to the nature of the study, limitations were present that could have impacted results. First, statistical power was limited by relatively small sample sizes. Larger sample sizes would allow for the inclusion of a larger, more representative population, thus yielding more precise results. Second, the SRS-2 and ADAMS are both caregiver report measures, introducing potential for parent report bias. However, by using more objective measurements, the data may have been less likely to be influenced by caregiver opinion or perspective. Furthermore, the SRS-2, a quantitative measure, assesses the severity of social impairments on continuum, allowing for more variability and greater sensitivity for correlational analyses.

The present study is of critical importance because it contributes to the gap in research that associates social functioning as a potential link between ASD and anxiety. By assessing social impairments and anxiety symptoms both within and between ASD and TD groups, this

study increases understanding in the mechanisms of ASD and anxiety symptomology, potentially giving rise to better informed treatment and support. Future research should include early identification of diagnoses and early intervention treatments to limit compounding symptoms of anxiety and autism disorders. While it is known that comorbid disorders such as anxiety may further impair social functioning and later social adjustments in individuals with ASD, future studies should examine the specific long-term effects of comorbid symptoms as well as how early identification and intervention may mitigate these effects. While the present study focused on preschoolers, longitudinal studies could be used to examine social impairments and general anxiety as children age and experience developmental milestones beyond early childhood. Additionally, because social impairments and anxiety symptoms were significantly correlated in the TD group, future directions should investigate this relationship on a larger scale, within differing populations and varied age ranges. Future research should also include developing treatment interventions that dually target anxiety and social functioning, especially given the risk of exacerbating anxiety problems as children with ASD develop from childhood to adolescence and onward. Greater understanding of the relationship between social impairments and anxiety symptoms that often present early in children with ASD can maximize positive outcomes for those at risk.

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Table 1.

Descriptive Statistics

Participants	Number of Observations	Chronological Age (Months)	SRS-2 Total *T*-Score	ADAMS General Anxiety Subscale Raw Score	Mullen ELC Score
		M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
ASD	46	48.56 (5.73)	65.70 (10.24)	7.52 (4.96)	57.70 (11.78)
TD	34	49.31 (8.00)	43.91 (4.43)	.82 (1.29)	101.09 (16.40)
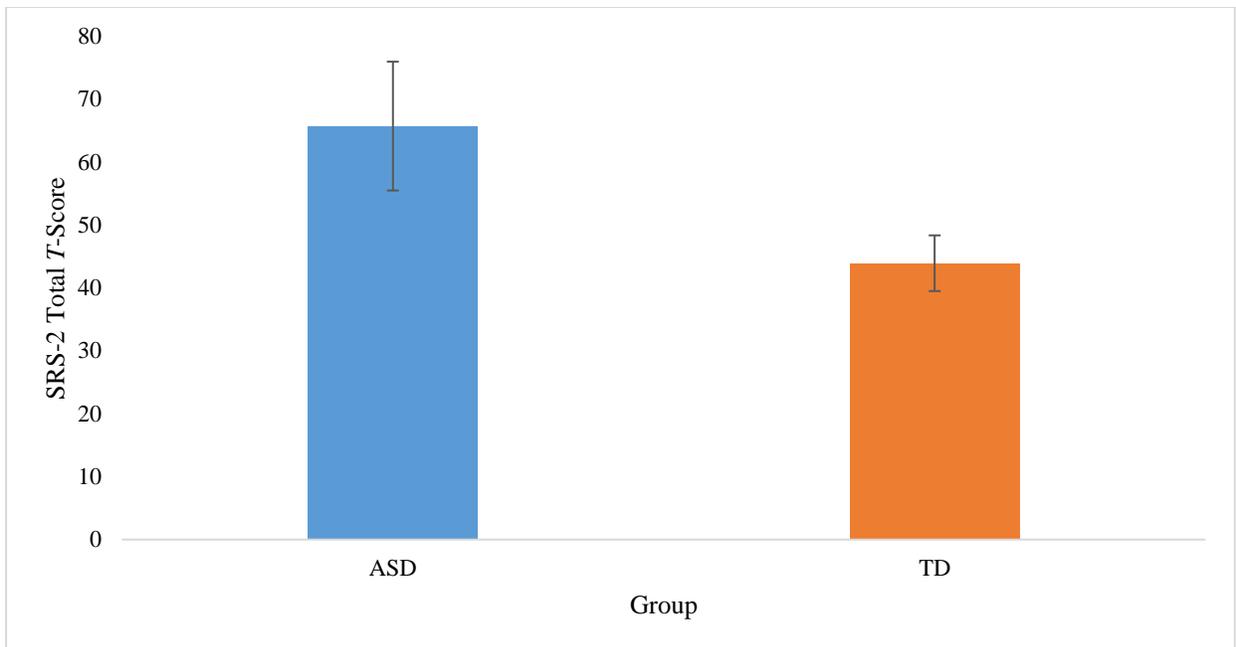
Figure 1. Mean SRS-2 Total *T*-Scores. Groups significantly differed in severity of social impairment, $F(1, 77) = 17.53$, $p < .001$.
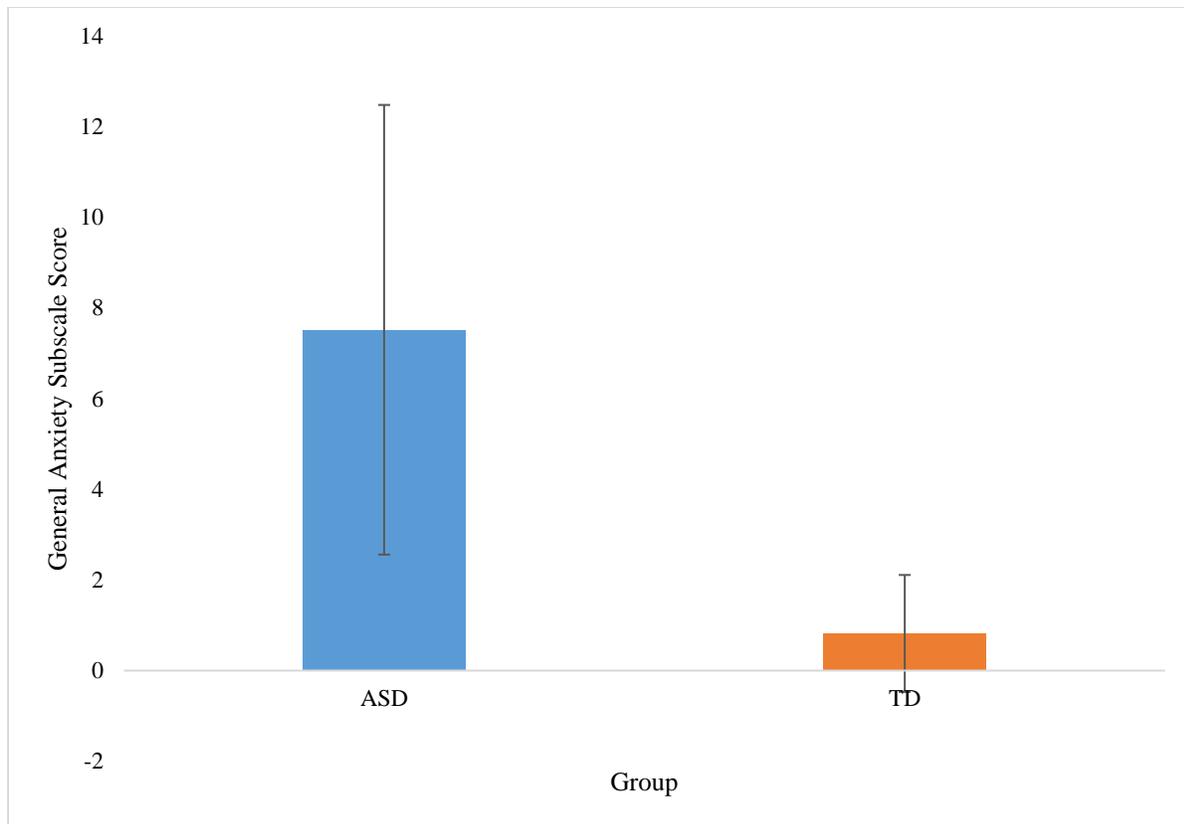
Figure 2. Mean General Anxiety Subscale Scores. Groups significantly differed in severity of anxiety symptoms, $F(1, 77) = 9.58$, $p = .003$.

Figure 3. Correlation between SRS-2 Total *T*-Score and General Anxiety Subscale Raw Score in both groups. In the ASD group, a significant positive correlation was observed between social impairments and anxiety symptoms, $r = .54$, $p < .001$. In the TD group, a significant positive correlation was also observed between the two variables, $r = .70$, $p < .001$.