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Friendship and Anxiety/Depression Symptoms in Boys with and without Autism Spectrum Disorder
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**Abstract:**
Social interaction difficulties in individuals with autism spectrum disorder (ASD) can be very challenging, especially amidst the transition to adolescence. Adolescents with ASD have high rates of comorbid internalizing disorders, which can further contribute to social difficulties and impact friendship experiences. This study compared the relations among autism symptom severity, anxiety and depression symptoms, and friendship experiences in age-matched boys with and without ASD (with IQ > 75). More severe symptoms of ASD were not associated with poorer friendship experiences overall in this sample. Internalizing symptoms predicted quantity of close friendships in the ASD sample. It is possible that individuals with stronger social skills and greater self-awareness are more vulnerable to internalizing symptoms.
Friendship and Anxiety/Depression Symptoms in Boys with and without Autism Spectrum Disorder
Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by impairments in social communication and social interaction, and restricted, repetitive behaviors, interests, or activities (American Psychiatric Association, 2013). The core social deficits observed in ASD range from difficulties with fundamental aspects of social interaction, such as eye contact and emotion perception, to more complex social processes like establishing, maintaining, and understanding relationships and complicated social contexts (Cervantes et al., 2013; Kjellmer et al., 2012; Matson, 2007). More severe symptoms of ASD may contribute to social-cognitive difficulties and compound challenges communicating with and relating to peers, and forming friendships. Additionally, many individuals with ASD experience symptoms of co-occurring mental health conditions (Lai et al., 2019; Simonoff et al., 2008). Anxiety and depression symptoms commonly emerge during the transition from childhood to adolescence in ASD (Gotham et al., 2015; Schwartzman & Corbett, 2020) and may exacerbate social challenges and friendship difficulties. The present study explored how ASD symptom severity and anxiety and depression symptoms are related to friendship in boys with ASD as compared to boys without autism or other developmental differences (i.e., neurotypical or NT peers).

Social Difficulties in Autism Spectrum Disorder

The majority of individuals with ASD experience significant difficulty forming and maintaining friendships. Children with ASD have fewer friends, attend fewer social gatherings, and have less stable friendships than their NT peers (Kasari et al., 2011; Kuo et al., 2013; Rowley et al., 2012). Additionally, social communication challenges and difficulties understanding and relating to peers can lead individuals with ASD to be rejected by peers and to experience social isolation (Orsmond et al., 2013). While not true of all individuals with ASD,
many desire to have friends and demonstrate social motivation. Children and adolescents with ASD without intellectual disability (ID) report greater loneliness and decreased friendship satisfaction compared to NT peers, which suggests they desire friendship and social connection, but may lack the skills and opportunities to do so (Bauminger & Kasari, 2000; Locke et al., 2010). The social problems observed in ASD can impact individuals’ understanding and expectations surrounding friendships (Bauminger et al., 2010). The disconnect between what they want and what they experience in relationships can contribute to difficulties maintaining appropriate friendships and may result in negative friendship experiences.

The relationship difficulties experienced by individuals with ASD may be particularly magnified during the transition from childhood to adolescence, as friendships gain increasing importance and the social landscape becomes more complex. Schall and McDonough (2010) noted that while individuals with ASD generally show improvements in basic communication competencies as they progress into adolescence, they continue to exhibit distinct impairment in social communication. Similarly, Seltzer et al. (2003) investigated a large sample of adolescents and adults with ASD and found that friendship was among the areas of functioning showing the least improvement with age. As individuals with ASD develop skills in other domains of functioning, their social deficits may become increasingly frustrating to them and apparent to their peers. This may be linked to internalizing symptoms and subsequent friendship experiences.

**Anxiety/Depression and Friendship**

It is well established that the absence of friendship and decreased friendship quality are associated with anxiety and depression symptoms in NT individuals (Buhrmester, 1990; Nangle et al., 2003). Models of internalizing symptoms and friendship outcomes among NT children and adolescents highlight the role of anxiety in the avoidance of social interaction and subsequent
social skills deficits resulting from missed practice opportunities. Resulting skill deficits lead to fewer positive peer interactions and the development of fewer friendships, which can worsen anxiety symptoms and contribute to the development of depressive symptoms and further social withdrawal (Seligman & Ollendick, 1998). There is a considerable body of research demonstrating that anxiety and depression are associated with poorer social skills in non-clinical and clinical populations of children (Chansky & Kendall, 1997; Coplan et al., 2004; Hamilton et al., 1997; Schneider, 2009; Spence et al., 1999), as well as poorer quality friendships (De Matos et al., 2003; Fordham & Stevenson-Hinde, 1999; Muris et al., 2001; Muris & Meesters, 2002).

The associations between internalizing symptoms and friendship are less understood among individuals with autism. Symptoms of anxiety and depression are common in ASD and a recent meta-analysis revealed that lifetime prevalence was 42% for anxiety disorders and 37% for depressive disorders among individuals with ASD (Hollocks et al., 2019). It has been proposed that the differences in arousal and sensory processing observed in individuals with ASD, and the core deficits in theory of mind and emotion identification may predispose them to problems with emotion regulation (Mazefsky & White, 2014). Disrupted emotion regulation has been implicated as a mechanism underlying anxiety disorders (Cisler et al., 2010) and depressive disorders (Riefie et al., 2011; Siener & Kerns, 2012). As individuals with ASD often have difficulty processing and integrating complex social information, the core social communication deficits can lead to inattention to important social cues, misinterpretation of social information, and trouble with turn-taking and reciprocity, which can contribute to frustration, anxiety, and social disappointments (Mazefsky & White, 2014). Further, the difficulties in identifying and understanding emotions in self and others may lead to trouble implementing successful emotion regulation strategies to ameliorate unpleasant feelings. These challenges may be associated with
increased anxiety in social situations, fewer positive peer interactions, avoidance of social
counters, and social withdrawal, which can all contribute to depressive symptoms (Seligman &
Ollendick, 1998).

Extensive research on anxiety has indicated that anxiety tends to developmentally
precede and increase the risk for depressive symptoms (Keenan et al., 2009). However, less
research has focused on the etiology of depression in autism. Smith and White (2020)
synthesized empirical findings over the last 20 years and proposed a model for the development
of depression in ASD. They highlighted the role of social motivation, which varies significantly
between individuals with ASD and over the course of development. They proposed that the
presence or absence of social motivation moderates the relationship between social
communication deficits and loneliness. Individuals with social deficits without strong social
motivation would be less likely to develop depression due to the limited discrepancy between
their social desires and ability to successfully navigate relationships (e.g., social desire and
ability are low). Thus, individuals with high social motivation would experience a greater
discrepancy between their social desires and their social communication abilities, which
contributes to loneliness (e.g., high social desire and low ability). Recent research has suggested
that girls with ASD without ID may demonstrate comparable social motivation to NT girls (Dean
et al., 2017; Sedgewick et al., 2016) and may be particularly vulnerable to anxiety and
depression and negative peer experiences (Greenlee et al., 2020; Zimmer-Gembeck, 2016).
Thus, there may be key differences among internalizing symptoms, social skills and motivation,
and friendship experience between boys and girls during this developmental period.

Internalizing symptoms have been found to be particularly prevalent in individuals with
ASD without intellectual disability (ID; Witwer & Lecavalier, 2010), who may be more aware of
their social deficits (Locke et al., 2010; Volkmar et al., 2012). They can become frustrated with unsuccessful attempts to forge and maintain friendships (Klin et al., 2005), which can lead to further internalizing symptoms (Kim et al., 2000). Higher levels of self-awareness are correlated with higher levels of anxiety and depression and lower self-esteem among NT individuals (Chen et al., 1998; Higgins, 1987; Wells, 1985) and increased self-awareness, and perhaps the discrepancy between their social desires and abilities, has been found to be associated with both anxiety and depression among individuals with ASD (Mazurek & Kanne, 2010; Sterling et al., 2008; Sukhodolsky et al., 2008).

As high rates of anxiety and depression symptoms (Ghaziuddin et al., 2002), lower rates of friendship (Mazurek & Kanne, 2010; Orsmond et al., 2004), and increased peer rejection and social isolation (Orsmond et al., 2013) are common experiences for children with ASD, further exploration of how social problems and anxiety/depression symptoms may impact friendship is warranted. There is a particular need to understand how these factors are at play during a developmental period marked by increasing social demands. The transition from childhood to adolescence represents a particularly important time for both social and emotional development.

A qualitative study exploring the nature of anxiety in adolescent boys with ASD found that desire to feel connected to others and self-criticism were among the main themes identified related to participants’ experience of anxiety (Acker et al., 2018). This suggests that self-awareness of social deficits may lend internalizing symptoms to be interpreted in the context of relationship desires and disappointments. This experience of internalizing symptoms may demotivate individuals to engage socially and pursue relationships, or may result in a hyper-awareness of disappointments in relationships; both may be associated with fewer or poorer friendship experiences.
Mazurek and Kanne (2010) found that children and adolescents with ASD with poor quality friendships had more anxiety and depression symptoms than those with good quality friendships or those with no friends. Additionally, Mazurek (2014) found that number of friendships significantly predicted self-esteem and anxiety/depression symptoms beyond the effects of loneliness and ASD symptom severity in an adult sample with ASD. These findings suggest that there is a strong relationship between quantity and quality of friendships and internalizing symptoms across children, adolescents, and adults with ASD. However, less quantitative research has explored the relationship between internalizing symptoms, social difficulties, and friendship amidst the transition from childhood to adolescence in youth with ASD without ID, as compared to NT youth.

**The Present Study**

The present study sought to examine the relationships among autism symptom severity, anxiety/depression symptoms, and friendship variables among boys with and without ASD. This study focuses on a particular developmental stage and gender (boys), as boys are more commonly diagnosed with ASD and recent literature suggests friendship patterns may differ during this developmental period between boys and girls. The shift from childhood to adolescence is a transitional period characterized by magnified social difficulty and the emergence or worsening of anxiety and depression symptoms in individuals with ASD. Social problems and internalizing symptoms may be associated with fewer friendship experiences among this population. Knowledge of how these factors are related to friendship in this population during the developmental transition may have important treatment implications. Elevated anxiety and depression symptoms may be associated with fewer friendship experiences, as these symptoms may heighten social challenges, particularly for individuals with pre-existing
social difficulties (i.e., ASD). The following hypotheses were tested: 1) that the ASD group would have more ASD symptoms, greater anxiety/depression symptoms, and fewer friendship experiences compared to the NT group, and 2) that among the ASD group, greater ASD symptom severity and more anxiety/depression symptoms would be associated with fewer friendship experiences.

Methods

Participants and Procedures

The sample included 80 boys (n = 40 with ASD and n = 40 NT peers) participating in a larger study examining psychophysiological differences in social reward processing. All participants were between the ages of 10 and 16 years (M = 13.81, SD = 1.91), and the ASD and NT groups were matched on age. Potentially eligible participants in the ASD group were identified from a pre-existing IRB-approved database at a university-based autism center. All participants participated in a comprehensive clinical evaluation and received numerous measures specific to autism as part of the diagnostic process. Participants were recruited by letter, email, and/or phone. Eligibility criteria included previous diagnosis of ASD based on the center’s clinical care model, which included clinical evaluation by a psychologist and/or physician and a comprehensive battery of standardized diagnostic and cognitive assessments, and a Full-Scale IQ above 75. Age-matched participants in the NT group were recruited through word-of-mouth, flyers, and online postings in the community. See Table 1 for sample characteristics.

The study was approved by the Institutional Review Board at [BLINDED FOR REVIEW]. Informed written consent was obtained from parents, and all children provided assent to participate in the larger study. During the study visit, parents completed a packet of
questionnaires to provide information about their children’s social, behavioral, and emotional functioning. Data from a subset of these measures were examined for the current analyses.

**Measures**

**Demographics**

Parents completed a brief demographic and background questionnaire developed for the purposes of the larger study. Information included child age, gender, race, ethnicity, and socioeconomic status.

**Friendship Status**

Parents also answered a series of questions developed for this study that specifically focused on their child’s friendships. Friendship questions included: 1) “Does your child have a best friend?” (yes/no); 2a) “Does your child have a close group of friends?” (yes/no), 2b) “If so, how many?”; and 3) “How often does your child spend time with friends outside of school?” (never, less than once per month, every few weeks, 1-2 days per week, 3-4 days per week, 5-6 days per week, every day).

**Autism Symptoms**

Autism symptoms were assessed using the Social Responsiveness Scale-Second Edition (SRS-2; Constantino & Gruber, 2012). The SRS-2 is a 65-item rating scale that provides a quantitative measure of symptoms associated with ASD, including reciprocal social behaviors, social communication, and stereotyped mannerisms. All items are on a Likert scale ranging from 1 (i.e., not true) to 4 (i.e., always true). The SRS-2 was designed as a continuous assessment of overall ASD traits, allowing for evaluation of a full spectrum of behaviors that range from typical to clinical. T-scores $\geq 76$ indicate severe deficits related to ASD that significantly impact interactions with others. Scores 66-75 indicate moderate difficulties; scores 60-65
indicate mild difficulties; and scores of $\leq 59$ suggest that the examinee does not demonstrate impairment consistent with an ASD diagnosis. Internal consistency ($a = .94 - .96$) and interrater reliability ($k = .77$) are adequate (Bruni, 2014).

**Anxiety/depression Symptoms**

Anxiety and depression symptoms were assessed using the Anxious/Depressed syndrome subscale of the Child Behavior Checklist, School-Age version (CBCL; Achenbach & Rescorla, 2001). The CBCL is a widely used, psychometrically sound parent-report measure that assesses a broad range of children’s behavioral and emotional problems. The CBCL/6-18 includes 113 items across eight subscales: Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule-Breaking Behavior, and Aggressive Behavior. Parents of participants completed the CBCL and rated items describing their children on a scale of 0 (i.e., not true), 1 (i.e., somewhat or sometimes true), and 2 (i.e., very true). Example Anxious/Depressed items are “Nervous, high-strung, or tense” and “Cries a lot.” The CBCL has been validated in youth with ASD, and the Anxious/Withdrawal subscale was found to have good sensitivity to symptoms of anxiety and depression in youth with ASD (Pandolfi et al., 2012), and good convergent validity with other measures of internal symptoms (Pandolfi et al., 2014). Several studies have reported good internal consistency ($\alpha = .71-.84$) among older children and adolescents with ASD without ID (Arias et al., 2021; Kuusikko et al., 2008; Schwichtenberg et al., 2013). While the Anxious/Depressed subscale T-score may be generated using gender and age norms, the present study used raw Anxious/Depressed scores in order to reflect the absolute level of problems and in accordance with the guidance set forth by the authors (Achenbach & Rescorla, 2001).

**Data Analytic Plan**
Descriptive statistics were generated for ASD and NT groups. Statistically significant differences in friendship characteristics were examined with Fisher’s exact test, chi-square test, or t-test depending on type of variable (i.e., categorical or continuous) and cell size. Friendship variables of interest included whether the child had a best friend, whether the child had a group of close friends, number of close friends, and amount of time spent with friends. Four multiple group regressions were run to examine the association between the aforementioned friendship characteristics and SRS T-score and CBCL Anxious/Depressed raw score in ASD and NT samples; coefficients were compared across groups. Family household income and child age were included as covariates in all models. For models with categorical/binary outcome variables, Pearson \( \chi^2 \) goodness-of-fit tests were run to investigate model fit. For models with continuous outcome variables, skewness and kurtosis of residuals were examined for normality. Analyses were completed with STATA I/C v. 16.

**Results**

**Group Comparisons**

Due to small cell sizes, Fisher’s exact tests were utilized to compare ASD and NT groups on having a best friend and having a group of close friends. Results indicated that the frequency of having a best friend and having a group of close friends was significantly higher in the NT group (\( p < .001 \)) (See Table 2). In the ASD group, 40% of respondents endorsed their child having a best friend and 42.5% of respondents endorsed their child having a group of close friends. In the NT group, 85% of respondents endorsed their child having a best friend and 92.5% of respondents endorsed their child having a group of close friends. A t-test was used to examine potential differences in the mean number of close friends in ASD and NT groups. Boys in the NT group (\( M = 3.80, SD = 1.53, range = 0-7 \)) had a significantly higher mean number of
friends as compared to boys in the ASD group ($M = 1.47$, $SD = 1.91$, range = 0-6), $t(73) = -5.84$, $p < .001$. Similarly, a chi-square test indicated that the frequency of spending time with friends at least once per week (vs. less than once per week) was significantly higher in the NT group, $\chi^2(1) = 10.75$, $p = .005$).

T-tests were used to compare ASD and NT groups in SRS-2 T-score and CBCL Anxious/Depressed subscale raw score. As expected, the ASD ($M = 76.33$, $SD = 9.67$) and NT ($M = 43.26$, $SD = 3.7$) groups differed significantly on the SRS-2, $t(75) = 19.72$, $p < .001$. In addition, the ASD ($M = 6.92$, $SD = 4.85$) and NT ($M = 1.95$, $SD = 2.28$) groups differed significantly Anxious/Depressed subscale of the CBCL, $t(76) = 5.79$, $p < .001$.

[A INSERT TABLE 2]

**Multiple group analysis**

**Having a Best Friend**

A multiple group binary logistic regression model examined the influence of SRS T-score and CBCL Anxious/Depressed raw score on the likelihood of having a best friend in the ASD and NT groups covarying for child age and household family income. It was found that SRS T-score and CBCL Anxious/Depressed raw score were not significantly associated with whether a child had a best friend in either group. In addition, CBCL Anxious/Depressed raw score coefficients did not significantly differ across groups ($\chi^2 = .26$, $p = .61$) (see Table 3). Pearson $\chi^2$ goodness-of-fit test indicated acceptable model fit.

[A INSERT TABLE 3]

**Having a Group of Close Friends**

A multiple group binary logistic regression model examined the influence of SRS T-score and CBCL Anxious/Depressed raw score on the likelihood of having a group of close friends in
the ASD and NT groups covarying for child age and household family income. It was found that
CBCL Anxious/Depressed raw score was significantly associated with having a group of close
friends in the ASD group only (B = .26, p = .03). Increased anxiety/depression was associated
with a higher likelihood of having a group of close friends; however, when CBCL
Anxious/Depressed raw score coefficients were compared across group models, they were not
significantly different ($\chi^2 = .34, p = .56$). Pearson $\chi^2$ goodness-of-fit test indicated acceptable
model fit.

**Number of Close Friends**

A multiple group linear regression examined the association between SRS T-score and
CBCL Anxious/Depressed raw score and number of close friends in boys with and without ASD
covarying for youth age and family household income. In the ASD group, CBCL
Anxious/Depressed score (B = .19, p = .007) and SRS T-score (B = -.08, p = .02) were
significantly associated with number of close friends. Increased anxiety/depression was
associated with having more close friends. Increased autism symptom severity was associated
with having fewer close friends. In the NT group, neither CBCL Anxious/Depressed raw score
nor SRS T-score were significantly associated with number of close friends; however, when
CBCL Anxious/Depressed coefficients were compared across groups, no significant difference
was found ($\chi^2 = 1.19, p = .27$). Kurtosis and skewness of model residuals indicated a normal
distribution and that linear regression was appropriate.

**Time Spent with Friends**

A multiple group binary logistic regression model examined the influence of SRS T-score
and CBCL Anxious/Depressed raw score on the likelihood of seeing friends at least once per
week in the ASD and NT groups covarying for child age and household family income. It was
found that SRS T-score and CBCL Anxious/Depressed raw score were not significantly associated with whether a child had weekly face-to-face contact with friends in either group. In addition, CBCL Anxious/Depressed raw score coefficients did not significantly differ across groups ($\chi^2 = .01, p = .92$). Pearson $\chi^2$ goodness-of-fit test indicated acceptable model fit.

**Discussion**

The results of this study add to the growing body of literature on friendship in boys with ASD without co-occurring ID. This study specifically examined the associations between autism symptom severity, symptoms of anxiety and depression, and friendship among boys with ASD as compared to their NT peers using multiple group analysis. As expected, the NT group had more friendships and more contact with friends, fewer autistic symptoms, and decreased anxiety/depression symptoms compared to the ASD group. However, contrary to our predictions, autism symptom severity was not significantly associated with three of the four friendship variables. Surprisingly, having close friends was associated with greater symptoms of anxiety and depression among boys with ASD.

Interestingly, ASD symptoms were not consistently associated with friendship experiences among this sample of boys with ASD. The only friendship variable significantly associated with ASD symptom severity was number of friends, indicating that the presence of more severe symptoms is associated with having fewer close friends. This might suggest that ASD symptoms differentially impact social processes involved in friendship. Maintaining multiple close relationships may require greater executive functioning skills to juggle the social task demands associated with each friendship. By contrast, ASD symptom severity did not predict other friendship outcomes in the present study, including having a best friend or having
contact with friends. Thus, it is possible that greater symptoms are not necessarily associated
with fewer friendships or less frequent contact with friends in boys with ASD and solid cognitive
functioning. While this is perhaps a hopeful finding, further exploration and replication of this
finding among larger samples is warranted. Notably, a prior study found that ASD symptom
severity was strongly associated with some aspects of friendship in a larger sample of children
and adolescents with ASD across a wider range of IQ and age (Mazurek & Kanne, 2010). The
relationship between IQ and ASD symptom severity is well established (Eaves et al., 1994;
Matson & Shoemaker, 2009; Prior et al., 1998), as individuals with lower cognitive ability tend
to have more severe symptoms of ASD. Individuals with lower IQ and more severe ASD
symptoms tend to have both decreased anxiety/depression symptoms and poorer friendship
outcomes (Mazurek & Kanne, 2010). The present study was limited to boys with ASD without
co-occurring intellectual disability (IQ greater than 75). As such, further exploration of the
relations among friendship and internalizing symptoms is warranted among children with
cognitive limitations.

Counter to our predictions, greater symptoms of anxiety and depression were associated
with having more close friends in the ASD sample. This finding is in line with results from a
previous study by Mazurek (2014) that revealed quantity of friendships was associated with
increased anxiety and depression symptoms in adults with ASD. It is likely that individuals with
ASD who do not have co-occurring ID possess more social motivation and are able to better
navigate and maintain friendships. These individuals may in turn possess greater self-awareness
of their social difficulties, which may contribute to additional symptoms of anxiety and
depression. It is also possible that having more friends may not necessarily protect against
negative emotional symptoms, such as feelings of loneliness and desire for emotional
connection. Mazurek and Kanne (2010) found that quantity and quality of friendships were not associated with decreased symptoms of anxiety and depression among youth with ASD. Thus, it is possible that friendship may not be protective against internalizing symptoms in youth with ASD, as it is in NT individuals (Bukowski et al., 2000; Ladd, 2006). Further exploration of the relationship between friendship and emotional functioning is needed among larger, and more diverse samples. Qualitative research may play an essential role in further examining the relationship between friendship quantity and internalizing symptoms in individuals with ASD across the lifespan.

Limitations and Future Directions

The present study is characterized by several limitations. First, the study is limited by a small sample; as a result, the analysis was underpowered to demonstrate robust findings. It is important to note that the ASD group was limited to boys without intellectual disability, and that the sample was almost entirely Caucasian. It is possible that the relationships among the variables investigated would appear quite different in racially and ethnically diverse populations and among in individuals with intellectual disability and physical or psychiatric comorbid conditions. As this study focused exclusively on boys with ASD without ID, findings are not generalizable to girls on the autism spectrum. Research has suggested that boys and girls with autism without ID demonstrate differences in social and communication skills (see Tubío-Fungueiríño et al., 2021 for review), social motivation (Dean et al., 2017; Head et al., 2014), and friendship experiences (Calder et al., 2013; Sedgewick et al., 2016). Additionally, girls with autism are more likely to mask social difficulties compared to boys (Hull et al., 2020), and this is associated with higher rates of anxiety and depression (Bargiela et al., 2016; Cage & Troxell-Whitman, 2019; Livingston et al., 2019). In light of these observed gender differences, future
studies should compare the relationships among social characteristics, internalizing symptoms, and friendship experiences in boys and girls separately.

The present study may have been strengthened by inclusion of more comprehensive measures of social functioning and social motivation, given the hypothesized relationship between social skills, social motivation, internalizing symptoms, and friendship (Smith & White, 2020). This study also used parent-reported symptoms of anxiety and depression. As internalizing symptoms are not always visible or effectively communicated to parents by individuals with ASD, it is possible that parents over- or under-reported symptoms of internalizing psychopathology. It may have been helpful to use both child and parent report to capture these symptoms and evaluate concordance among reporters. Additionally, symptoms of anxiety and depression were assessed using an empirically-derived syndrome scale from a broadband measure of social, emotional, and behavioral problems. Future studies may consider capturing internalizing symptoms with measures specifically designed to assess anxiety and depression symptoms in order to assess these constructs more comprehensively.

This study also relied on parent-report of quantity of friendships and frequency of contact with friends due to the difficulties that individuals with ASD demonstrate in understanding social relationships and what defines a friend. Future studies on friendship among youth with ASD should evaluate how youth with autism define friends. Concordance between youth- and parent-reports of friendships should also be examined, as some research has indicated they may be discrepant (Kuo et al., 2013). As the current study focused on quantity of friendships and frequency of contact with friends, qualitative aspects of friendships, such as trust, intimacy, reciprocity, and conflict were not assessed. Friendships may also vary based on context (e.g., group activities, school, online) and developmental period. The transition from childhood to
adolescence may be particularly isolating and challenging for individuals to maintain friendships. This time often involves a transition between school placements, which may be associated with increased challenges navigating social groups and establishing and maintain relationships in a new environment. This transitional developmental period may be particularly difficulty for individuals with autism, for whom transitions are already challenging. This is also a time when individuals with and without autism may experience increased mental health concerns. Future research should examine the relations among autism symptoms, internalizing symptoms, context, and friendship variables during this key developmental period.

The online context for friendship was not explicitly investigated in the current study. Qualitative information from many adolescents with ASD suggests that online video gaming and social media platforms provide individuals with ASD increased social access. Mazurek (2013) found that individuals with ASD who use social networking sites are significantly more likely to have a close friend than those who do not. The present study did not assess friendship and contact with friends through this medium and it is possible that including online gaming or social media-based relationships may have impacted the findings of this study. Future research should investigate how sociocultural and demographic variables, as well as media-based communication, contribute to friendship outcomes in ASD among more diverse samples.

Despite these limitations, the present study extends the literature on friendship on ASD by exploring how internalizing symptoms and severity of autism symptomology are related to quantity of friendships and frequency of contact with friends during an important developmental period, as compared to their NT peers. As much of the prior research in this area has been limited to ASD samples without comparison to NT peers, or relied on adult samples, this study provides an important contribution to research on friendship in autism amidst the transition to
adolescence. These results will help inform future research on friendship in ASD and inform treatments for individuals with ASD without ID, such as social skills interventions. If future research continues to demonstrate a relationship between internalizing symptoms and friendship experiences, then social skills intervention programs should address the internalizing symptoms associated with establishing/maintaining social relationships and perceived friendship quality. As research continues to identify which factors influence friendship success in ASD, more comprehensive treatments can be developed to target the specific skills that will result in decreased symptoms of anxiety and depression related to social relationships.
References


from school age through young adulthood in samples with autism spectrum disorder and


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https://doi.org/10.1097/CHI.0b013e318179964f


### Table 1 Sample characteristics

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<td><strong>n (%) / M (SD)</strong></td>
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<td>25-34,999</td>
<td>6 (7.5%)</td>
<td>4 (10%)</td>
<td>2 (5%)</td>
</tr>
<tr>
<td>35-49,999</td>
<td>7 (8.75%)</td>
<td>7 (17.5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>50-74,999</td>
<td>18 (22.5%)</td>
<td>5 (12.5%)</td>
<td>13 (32.5%)</td>
</tr>
<tr>
<td>75-99,999</td>
<td>19 (23.75%)</td>
<td>10 (25%)</td>
<td>9 (22.5%)</td>
</tr>
<tr>
<td>100K+</td>
<td>20 (25%)</td>
<td>6 (15%)</td>
<td>14 (35%)</td>
</tr>
<tr>
<td>Missing</td>
<td>1 (1.25%)</td>
<td>1 (2.5%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

\(^a\)In the ASD group, 2 participants were Multiracial. In the NT group, 3 participants were Multiracial, 2 participants were Asian, and 1 participant was Black.
**Table 2** Comparisons of ASD symptom severity, internalizing symptoms, and friendship outcomes for the NT and ASD groups

<table>
<thead>
<tr>
<th></th>
<th>ASD</th>
<th>NT</th>
<th>Sig. Dif.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%) / M (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SRS-2</strong></td>
<td>76.33 (9.67)</td>
<td>43.26 (3.7)</td>
<td>( t (75) = 19.72, p &lt; .001 )</td>
</tr>
<tr>
<td><strong>CBCL Anxious/Depressed</strong></td>
<td>6.92 (4.85)</td>
<td>1.95 (2.28)</td>
<td>( t (76) = 5.79, p &lt; .001 )</td>
</tr>
<tr>
<td>Having a best friend</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16 (40%)</td>
<td>34 (85%)</td>
<td>( p &lt; .001 )</td>
</tr>
<tr>
<td>No</td>
<td>22 (55%)</td>
<td>5 (15%)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>2 (5%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>Having a group of close friends</td>
<td></td>
<td></td>
<td>( p &lt; .001 )</td>
</tr>
<tr>
<td>Yes</td>
<td>17 (42.5%)</td>
<td>37 (92.5%)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>22 (55%)</td>
<td>3 (7.5%)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>1 (2.5%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>Time spent with friends</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At least once per week</td>
<td>15 (37.5%)</td>
<td>30 (75%)</td>
<td></td>
</tr>
<tr>
<td>Less than once per week</td>
<td>24 (60%)</td>
<td>10 (25%)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>1 (2.5%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>Number of close friends</td>
<td>1.47 (1.91)</td>
<td>3.8 (1.53)</td>
<td>( t (73) = -5.84, p &lt; .001 )</td>
</tr>
</tbody>
</table>

\[ a \] The Social Responsive Scale-2 (SRS-2) T-score reflects the sum of responses which serves as an index of severity of social skills across the autism spectrum.

\[ b \] The Child Behavioral Checklist (CBCL) Anxious/Depression scale is an empirically derived syndrome scale. The raw score provides a sum of scored responses consistent with anxious/depression symptomology and reflects the absolute level of problems.
### Table 3

Multiple group regressions examining associations between clinical and demographic characteristics and friendship for NT and ASD groups

<table>
<thead>
<tr>
<th></th>
<th>ASD</th>
<th>NT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( B (SE), \ p )</td>
<td>( B (SE), \ p )</td>
</tr>
<tr>
<td><strong>Having a best friend</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBCL Anxious/Depressed raw score</td>
<td>.02 (.09), \ p = .855</td>
<td>.15 (.24), \ p = .541</td>
</tr>
<tr>
<td>SRS T-score</td>
<td>.02 (.05), \ p = .692</td>
<td>-.01 (.17), \ p = .947</td>
</tr>
<tr>
<td>Age</td>
<td>-.02 (.21), \ p = .908</td>
<td>-.46 (.41), \ p = .256</td>
</tr>
<tr>
<td>Income</td>
<td>.12 (.21), \ p = .578</td>
<td>.28 (.33), \ p = .399</td>
</tr>
<tr>
<td><strong>Having a group of close friends</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBCL Anxious/Depressed raw score</td>
<td>.26 (.12), \ p = .032</td>
<td>.73 (.79), \ p = .359</td>
</tr>
<tr>
<td>SRS T-score</td>
<td>-.11 (.06), \ p = .066</td>
<td>-.12 (.20), \ p = .547</td>
</tr>
<tr>
<td>Age</td>
<td>.02 (.20), \ p = .938</td>
<td>-.20 (.45), \ p = .660</td>
</tr>
<tr>
<td>Income</td>
<td>-.20 (.19), \ p = .287</td>
<td>-.133 (.54), \ p = .015</td>
</tr>
<tr>
<td><strong>Number of close friends</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBCL Anxious/Depressed raw score</td>
<td>.19 (.07), \ p = .007</td>
<td>.06 (.10), \ p = .547</td>
</tr>
<tr>
<td>SRS T-score</td>
<td>-.08 (.03), \ p = .021</td>
<td>.12 (.08), \ p = .166</td>
</tr>
<tr>
<td>Age</td>
<td>-.12 (.17), \ p = .460</td>
<td>-.09 (.18), \ p = .631</td>
</tr>
<tr>
<td>Income</td>
<td>-.23 (.18), \ p = .193</td>
<td>-.26 (.18), \ p = .152</td>
</tr>
<tr>
<td><strong>Contact with friends</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBCL Anxious/Depressed raw score</td>
<td>-.01 (.09), \ p = .902</td>
<td>-.03 (.13), \ p = .840</td>
</tr>
<tr>
<td>SRS T-score</td>
<td>.04 (.04), \ p = .393</td>
<td>-.02 (.11), \ p = .848</td>
</tr>
<tr>
<td>Age</td>
<td>-.13 (.19), \ p = .498</td>
<td>-.29 (.27), \ p = .282</td>
</tr>
<tr>
<td>Income</td>
<td>-.26 (.21), \ p = .221</td>
<td>-.39 (.30), \ p = .191</td>
</tr>
</tbody>
</table>
Table 4 Differences in CBCL Anxious/Depressed beta coefficients and friendship variables for ASD and NT groups

<table>
<thead>
<tr>
<th>Group differences</th>
<th>in $B^a$</th>
<th>$\chi^2$ (1)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having a best friend</td>
<td>-0.13</td>
<td>$.26$</td>
<td>0.607</td>
</tr>
<tr>
<td>Having a group of close friends</td>
<td>-0.47</td>
<td>$.34$</td>
<td>0.558</td>
</tr>
<tr>
<td>Number of close friends</td>
<td>0.13</td>
<td>1.19</td>
<td>0.275</td>
</tr>
<tr>
<td>Contact with friends</td>
<td>0.02</td>
<td>$.01$</td>
<td>0.919</td>
</tr>
</tbody>
</table>

$^a$Group differences are ASD minus NT