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Relations among Social Anxiety, Friendship Quality, and Social Competence in Higher Functioning Children and Adolescents with Autism

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UNIVERSITY OF MIAMI

RELATIONS AMONG SOCIAL ANXIETY, FRIENDSHIP QUALITY, AND SOCIAL
COMPETENCE IN HIGHER FUNCTIONING CHILDREN AND ADOLESCENTS
WITH AUTISM

By

Lauren Usher

A THESIS

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Master of Science

Coral Gables, Florida

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Relations among Social Anxiety, Friendship
Quality, and Social Competence in Higher
Functioning Children and Adolescents with
Autism

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Social anxiety, friendship quality, and social competence have been studied considerably in typical development and autism, but the interrelations among all three constructs have not been assessed. This study examined mean differences in these variables in higher functioning children and adolescents with autism (HFA) and a comparison group of individuals without an autism diagnosis (COM). A mediation model tested whether friendship quality mediated the relation between social anxiety and social competence separately for the two diagnostic groups. Thirty-nine higher functioning children and adolescents with autism and 39 comparison children and adolescents without autism completed a series of questionnaires on social anxiety and friendship quality and were observed during an interaction with an unfamiliar peer. Parents also completed a measure of their child's social anxiety. Behaviors observed during the interaction were coded to create an index of social competence. Significant group differences were found, as well as associations among several variables of interest. The mediation indicated non-significant indirect effects for both groups. Results are discussed in reference to potential implications for the development of treatment/interventions.

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CHAPTER 1: INTRODUCTION

Autism spectrum disorders (ASDs) are characterized by a triad of social impairments, communication deficits, and restricted and repetitive interests (American Psychological Association, 2000). Despite having average or above average IQ, higher functioning individuals with autism (HFA) demonstrate adaptive functioning levels well below their typically developing (TD) peers, particularly in the domain of social skills (Kenworthy, Case, Harms, Martin, & Wallace, 2010). Parent- and self-reports indicate that children and adolescents with autism demonstrate elevated, and often clinically-significant, levels of anxiety (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Kuusiko et al., 2008; Simonoff et al. 2008). During the transition into adolescence, HFA youth, relative to lower functioning individuals, may be at the greatest risk for anxiety because of their awareness of their own interpersonal differences. Adding to the social deficits inherent in ASDs, anxiety may further hinder the development of social competence by impacting the quantity and quality of a child's friendships. Therefore, it is important to better understand the nature and consequences of anxiety in children with autism. The primary goal of this study was to examine the relations among social anxiety, friendship quality, and social competence in HFA children and adolescents as well as in children without an ASD diagnosis. Specifically, the mediating role of friendship quality on the association between social anxiety and observed social competence was examined.

Social Anxiety and Autism

High trait anxiety is common in individuals with autism spectrum disorders and particularly HFA individuals (Tantam, 2000; Gillott, Furniss, & Walter, 2001). Parent- and self-reports have revealed social anxiety to be one of the most common subtypes of

anxiety in children with autism (Simonoff et al., 2008; de Bruin et al., 2006). Social anxiety is performance-related and includes a fear of negative evaluation in social situations and anticipated feelings of humiliation (Mancini, van Ameringen, Bennett, Patterson, & Watson, 2005). Mayes, Calhoun, Murray, Ahuja, & Smith (2010) found that HFA children were not significantly different from children with anxiety disorders while lower functioning children with autism (LFA) displayed significantly less anxiety than children with an anxiety disorder, according to parent reports. Furthermore, in an examination of specific anxiety symptoms, only 44% of LFA children were described by their parents as “self-conscious or easily embarrassed,” while 66% of HFA children, 64% of children with an anxiety disorder, and 54% of TD children endorsed this symptom. Therefore, heightened social anxiety may be unique to higher functioning individuals because it requires a desire for social interactions and insight into one’s differences.

In addition to high rates of comorbidity, there is a significant degree of overlap in the behavioral presentation of social anxiety and autism (e.g., lack of eye contact, fidgeting behaviors, flat affect; Tyson & Cruess, 2011; Mancini et al., 2005). Two models have been proposed to account for these overlaps: (1) a shared core deficit in emotion regulation and (2) a developmental cascade in which HFA children’s awareness of their social deficits leads to the emergence of social anxiety. In the first model, emotion regulation is implicated as a common core deficit in both anxiety and autism. According to the emotion regulation model of anxiety proposed by Mennin, Heimberg, Turk, and Fresco (2002), general anxiety disorder is characterized by heightened emotional intensity, poor emotional understanding, negative perception of emotional events, and maladaptive coping strategies. Comparable patterns of dysregulation are also evident in

HFA individuals, who have been shown to have lower levels of emotional understanding and higher negative reactivity than TD individuals (Losh & Capps, 2006; Konstantareas, 2006). Furthermore, in a sample of high-risk infants (i.e., younger siblings of children with autism), those who went on to receive a diagnosis themselves displayed a clear pattern of early emotional reactivity and dysregulation (Garon et al., 2009). In a recent study, Samson, Huber, and Gross (2012) found that HFA adolescents and adults reported being less likely to use adaptive emotion regulation skills such as reappraisal relative to a non-ASD comparison group. In addition, the HFA individuals' reported low levels of self-efficacy when using their limited regulation strategies. Recent developments in anxiety interventions for youth have integrated an emotion regulation approach (Ehrenreich, Goldstein, Wright, & Barlow, 2009), and such approaches are beginning to be incorporated into interventions for children with autism (e.g., Wood et al., 2009).

An alternative explanation for HFA individuals' particularly high social anxiety is that it may emerge as a reaction to the syndrome. The social anxiety experienced by HFA children and adolescents may arise from their awareness of, and insight into, their poor social abilities (Attwood, 2000). Syndrome-specific social deficits accompanying a diagnosis of autism include poorly regulated eye contact and lack of facial expressions, reduced sharing of interests and affect, and difficulties modifying behavior in different social contexts (APA, 2000). Together these deficits lead to atypical and often negative social learning experiences which could potentially lead to increased social anxiety. This developmental cascade model may be particularly relevant for HFA children and adolescents, who possess a moderate level of interpersonal insight and are apt to be self-conscious of these social impairments (Bellini, 2004). The combination of anxiety with

the social deficits of autism and a potential heightened awareness of these problems creates a negative feedback cycle impacting the child's sense of efficacy in social interactions. Most likely the overlap between autism and anxiety is due to a combination of shared vulnerabilities (i.e., emotion regulation deficits) and altered early social learning experiences. Regardless, the risk for the development of social competence deficits is heightened.

Social Anxiety as a Predictor of Deficits in Social Competence

Throughout late childhood and adolescence, social anxiety increases for both TD children and children with autism (Mancini et al., 2005; White, Bray, & Ollendick, 2012). This rise may be due in part to the increasing salience and demands of the social environment for adolescents (Erath, Flanagan, Bierman, & Tu, 2010). These heightened demands, relevant to ASD and TD adolescents, emerge in part from transitions in the school environment including a larger, less structured social setting and the negotiation of new social groups and cliques (Parker, 2006). As adolescents transition into new, less predictable, and more complex social environments (i.e., new school, workplace) they must be able to independently and flexibly implement social skills. Social anxiety may significantly negatively impact social competence development.

Generally, social competence, a core component of adaptive functioning, refers to the ability of an individual to incorporate discrete social skills (such as reciprocity and listening skills) into everyday interactions in a flexible and adaptive manner (Lillvist, Sandberg, Bjorck-Akesson, & Granlund, 2009). Social competence is a prerequisite for children to achieve interpersonal success as they transition into adolescence (Elliott & Gresham, 1987). Spence (2003) constructed a model of social competence that comprises

several dimensions, including problem solving skills, self-regulation, and perspective-taking. Interactions with unfamiliar peers are ideal settings in which to observe and assess the various components of social competence, as individuals must independently and flexibly employ their existing skills rather than relying on supports offered by familiar family members or friends. In addition, during late childhood and into adolescence, behavioral observation measures, rather than parent- or teacher- reports, may be better indices of social competence. This is due in part to the increased amount of time children spend with their peers instead of their parents. Social anxiety can have deleterious effects on the development of social competence in both individuals with autism and TD individuals. According to social learning theory, essential social skills are acquired in large part through informal learning experiences in children's day-to-day social interactions (Bandura & Walters, 1963). Therefore, factors that impact the quantity and quality of social interactions (such as autism or anxiety) reduce opportunities to learn age-appropriate social skills.

One way that social competence may be limited by anxious individuals is through avoidance of social situations in an attempt to reduce the discomfort experienced during these interactions. Scores on the Fear of Negative Evaluation subscale of the Social Anxiety Scale for Children (La Greca & Stone, 1993) have been shown to be negatively correlated with HFA adolescents' observed social competence with an unfamiliar peer (Usher & Henderson, 2012). Social avoidance due to fear of negative evaluations can create a feedback loop in which negative experiences lead to anxiety and avoidance, which then limit opportunities for practicing social skills and developing social competence. In turn, these deficits in social competence may promote increased anxiety,

continuing the negative cycle. One specific factor that might limit social skill development is the failure to develop and maintain high quality friendships.

Developmental Significance of Friendship

As children transition to adolescence, peer relationships tend to replace parental relationships as the primary source of companionship (Buhrmester & Furman, 1987; Buhrmester, 1990). Peer relationships have the potential to develop into friendships based on stable social interactions and the development of exclusivity (Hartup, 1993). During later childhood and adolescence, friendships take on more mature qualities including increased intimacy and disclosure (Erath, Flanagan, & Bierman, 2007). High-quality friendships provide a source of companionship and safety for adolescents, so the failure to develop and maintain meaningful friendships is detrimental for TD and HFA children.

Several research studies support the role of friendships as protective factors for children and adolescents (Rae-Grant, Thomas, Offord, & Boyle, 1989; Erath et al., 2010). Friendships can be advantageous for children and adolescents with regards to peer victimization (Hodges, Boivin, Vitaro, & Bukowski, 1999) and adjustment to school (Ladd, 1990), as well as internalizing symptoms (Mazurek & Kanne, 2010). In adolescents, Erath et al. (2010) found that friendships moderated the relation between social anxiety and loneliness in a sample of middle-school children, such that high-quality friendships acted as a buffer for experiencing loneliness among individuals with high social anxiety. The authors proposed that friendships offered a safe relationship in which children with high anxiety could “let down their guard.” In a study by Bulotsky-Shearer, Bell, Romero, and Carter (in press), peer play mediated the relation between internalizing behaviors and learning outcomes in low-income preschool children.

Internalizing problems early in the preschool year affected the ability to engage in peer play which in turn influenced learning outcomes. The authors suggested that peer interactions provide an important setting for socially-mediated learning.

One especially important function of high-quality friendships is to provide a safe, comfortable and naturally-occurring setting for practicing new age-appropriate social skills and competence. Friendships require individuals to have a certain level of social competence in order to begin the relationship. Furthermore, high-quality friendships also provide an important channel to individuals' advancement in social competency by providing the ideal situation in which skills can be practiced and incorporated into an individual's schema of social interaction (Hartup, 1993). In addition, if internalized properly, the social skills learned and practiced within the context of friendships can be implemented flexibly in future social situations, including romantic relationships and interactions in the workplace, therefore substantially impacting adaptive functioning in many crucial settings. However, the acquisition and maintenance of high-quality friendships can be especially difficult for anxious youth and HFA youth who are uncomfortable in social situations.

Autism and Friendship

In contrast to previous studies suggesting that individuals with autism were unmotivated to pursue friendships, current research indicates that most individuals with autism in fact desire friendships and experience loneliness in the absence of these relationships (Bauminger & Kasari, 2000). Still, several studies indicate that individuals with autism spectrum disorders report fewer friends and less contact with friends than do TD adolescents (Bauminger, Shulman, & Agam, 2003). Orsmond, Krauss, and Seltzer

(2004) found that almost half of their sample of 235 adolescents and adults with an ASD diagnosis had no friendships that could be considered reciprocal and outside of an organized setting. The friendships that HFA children and adolescents do have are typically lower quality in terms of perceived levels of companionship, security, and help compared to the friendships of typically developing youth (Bauminger & Kasari, 2000). However, friendships have been hypothesized to have a positive influence for HFA children similar to the friendships of TD children (Bauminger et al., 2008).

Social Anxiety and Friendship

Like HFA children and adolescents, TD adolescents with elevated levels of social anxiety report fewer and lower quality friendships (La Greca & Lopez, 1998). Social anxiety has also been shown to have a significant negative effect on newly-formed friendships during adolescence (Vernberg, Abwender, Ewell, & Beery, 1992). Anxious individuals' avoidance of social situations may hinder friendship growth by restricting opportunities for the development of intimacy in existing relationships.

A study by Strauss, Lahey, Frick, Frame, and Hynd (1988) demonstrated that anxious children were most likely to be neglected by their peers (i.e., not named as most or least liked by many children in sociometric nominations). The same study found that anxious children, when rated, were regarded as less liked than their peers in the classroom. The lack of rapport that anxious children cultivate among peers may limit opportunities for friendship formation. This lack of friendships can be detrimental to the individual's development of social competence.

Present Study

Social anxiety may negatively impact friendship development at a developmental stage in which successful friendships are necessary for the achievement of age-appropriate social skills and competence. Social anxiety, negative peer interactions, and social competence deficits have been shown to be interrelated in children with anxiety disorders (Ginsburg, La Greca, & Silverman, 1998). However, despite high levels of social anxiety in HFA children and adolescents, little is known about these interrelations in individuals with autism. Moreover, past studies that have focused on these constructs in individuals with autism are limited by the confounding of assessments of symptom severity and social skills, or the exclusive reliance on parent or teacher reports of social competence (for example, Greco & Morris, 2005). No study to date has examined the relations between social anxiety, friendship quality, and observed social competence in children and adolescents with autism. Therefore the overarching goal of this study was to examine the interrelations among these variables in higher functioning children and adolescents with a diagnosis of autism. In addition, this study used direct observations of social skills and competence during participants' interactions with unfamiliar peers. This context is important because it frames the interaction in a novel setting, where social anxiety may be heightened and the social skills that HFA children bring to novel contexts can be observed.

Specific Aims

There were two specific aims to this study:

1. To compare mean levels of social anxiety, friendship quality, and social competence in higher-functioning individuals with autism and an age-, IQ- and gender matched comparison group (COM). It was hypothesized that HFA participants would a) self-report and be reported by their parents to have higher levels of social anxiety, b) self-report lower quality friendships, and c) exhibit lower levels of social competence than COM participants.
2. To examine the interrelations among social anxiety, friendship quality, and observed social competence during an interaction with an unfamiliar peer in both the HFA and COM samples. A mediation model was hypothesized in which (a) Social Anxiety would predict Social Competence, (b) Social Anxiety would predict Friendship Quality, and (c) the association between Social Anxiety and Social Competence would be partially mediated by the effect of Friendship Quality (see Figure 1). This model was expected to hold for both HFA and COM participants.

CHAPTER 2: METHOD

Participants

Participants were 80 children and adolescents (40 HFA, 40 COM) who were initially recruited and consented as part of a larger study of social-emotional adjustment in higher functioning children and adolescents with autism. However, one male participant from each diagnostic group was excluded from all analyses due to a failure of the recording equipment during the interaction. Thus, the final sample was composed of 78 children (39 HFA, 39 COM; $M_{\text{age}} = 12.79$ years, $SD = 2.40$ years) and included 68 males and 10 females. For the larger study, participants with HFA were recruited through a letter mailed to parents of children with Asperger Syndrome and/or high-functioning autism through the Center for Autism and Related Disabilities at the University of Miami. A comparison sample of children without an ASD diagnosis (COM) was recruited through letters sent home from school with students in the Miami-Dade County school system. The letters included an explanation of the study and contact information for families who were interested in participating. Interested families were invited to take part in three laboratory visits that included diagnostic confirmation and IQ testing, along with several additional physiological and behavioral assessments.

All participants needed to have a verbal IQ greater than 70 to be retained in the final sample. HFA participants had to meet criteria on two out of three of the following diagnostic measures: Social Communication Questionnaire (SCQ), Autism Spectrum Screening Questionnaire (ASSQ), and Autism Diagnostic Observation Schedule (ADOS). COM participants were excluded if they met criteria on two out of three diagnostic measures. A brief version of the Wechsler Intelligence Scale for Children-Fourth Edition

(WISC-IV; Wechsler, 2003), comprised of the Vocabulary and Similarities subtests, was administered to all participants to obtain an index of verbal IQ. Following completion of the larger study, participants were invited to return to the laboratory for two visits focused on friendships and peer interactions.

Procedure

Parents of participants were provided with additional study information over the phone. If families decided to participate, they were scheduled for two visits to the Social Development Laboratory in the Department of Psychology at the University of Miami. In the first visit, parents completed informed consent and children provided written assent. Parents and children completed a series of questionnaires on social anxiety and friendship. After the first visit, HFA and COM participants were matched on age, verbal IQ, and gender, and matched dyads were scheduled to return to the laboratory to take part in the peer interaction session. Peer interaction sessions were videotaped for later behavioral coding. Families were remunerated \$40 for participation in each visit.

Measures

Social Anxiety Scale for Children-Revised. The Social Anxiety Scale for Children-Revised (SASC-R; La Greca & Stone, 1993) was used to assess self-reported and parent-reported social anxiety. The SASC-R contains 22 statements that are rated on a 5-point Likert scale from 1 (not at all) to 5 (all the time). This measure is composed of three scales: Fear of Negative Evaluation from Peers (FNE; 8 items), e.g., “I worry about being teased;” Social Avoidance and Distress-Specific (SAD-N; 6 items), e.g., “I worry about doing something new in front of other kids;” and Social Avoidance and Distress-General (SAD-G; 4 items), e.g., “I’m quiet when I’m with a group of kids.” The SASC-

R and its three subscales have been shown to display good internal consistency, discriminant and concordant validity, and test-retest reliability (La Greca & Stone, 1993). Of interest were the three subscales, FNE, SAD-N, and SAD-G.

Multidimensional Anxiety Scale for Children. The Multidimensional Anxiety Scale for Children (MASC; March, Parker, Sullivan, Stallings, & Conners, 1996) is a self-report measure that is used to assess anxiety in children age 8 to 16. The MASC consists of 39 items, which are divided into the following four factors: Physical Symptoms (tense/restless and somatic/autonomic), Social Anxiety (humiliation/rejection and public performance fears), Harm Avoidance (perfectionism and anxious coping), and Separation Anxiety. The MASC and its four factors display excellent internal reliability and test-retest validity (March et al., 1996). Of interest in the current study was the Social Anxiety factor.

Friendship Qualities Scale. The Friendship Qualities Scale (FQS; Bukowski, Hoza, & Boivin, 1994) was used to assess participants' self-reported attributes of their best friendship. The FQS contains 46 items assessing companionship, conflict, help/aid, security, and closeness in the friendship on a 5-point Likert scale from 1 (not true) to 5 (really true). The FQS has demonstrated adequate reliability and validity with internal consistencies for each scale ranging from .71 to .86 (Bukowski, Hoza, & Boivin, 1994). The five FQS subscales were used to index friendship quality.

Network of Relationships Inventory. The Network of Relationships Inventory (NRI; Furman & Buhrmester, 1985) is a self-report measure that assesses the characteristics of various significant relationships in a child's life. Each of the 30 items on the NRI inquires about a particular trait in the context of each of eight relationships, if

applicable (mother, father, sibling, relative, boyfriend/girlfriend, same-sex friend, other-sex friend, and an optional extra person). The NRI was used to examine qualities in each of the following ten categories: companionship, conflict, instrumental aid, antagonism, intimacy, nurturance, affection, admiration, relative power, and reliable alliance. The scale demonstrates adequate reliability and validity, with internal consistency alphas around .80 (Furman, 1996). The same-sex friend items were used to index friendship quality.

Observed Social Competence during Interaction with an Unfamiliar Peer

Participants were observed during a series of structured (Teaching Task, Teamwork Task) and unstructured (Initial Greeting, Get to Know You Task) tasks with an age-, IQ- and gender matched peer. Behaviors during the Get to Know You Task, Teaching Task, and Teamwork Task were coded to index Social Competence.

Approximately 25% of the sample was double-coded by two graduate research assistants for reliability purposes. Intraclass correlation coefficients (ICCs) for all tasks ranged from .70 to .78

Get to Know You. Each dyad was given five minutes at the beginning of the session to get to know each other. The researcher left them alone in the room to do so and did not provide specific instructions, simply saying, “Why don’t you guys get to know each other? I’ll be back in about five minutes.” Videos were coded for each child’s total time talking and frequency of shares. A share was defined as an individual’s telling anything about themselves to the peer or sharing information about thoughts, feelings, or opinions. In addition, eye contact, conversational efficacy, and the appropriateness of the interaction were coded on 5-point Likert scales. Codes for eye contact range from 1

(frequent staring or never looking at peer) to 5 (looking away when not interacting and looking at peer when interacting). Codes for conversational efficacy range from 1 (rarely shows appropriate conversational skills) to 5 (shows appropriate conversational skills throughout). Conversational efficacy encompasses the following skills: turn-taking, taking half the responsibility for maintaining the conversation, answering and asking questions appropriately, initiating topics appropriate to the situation of getting to know someone for the first time, responding and sharing appropriate information (i.e., not giving too much personal information about self or others). Codes for appropriateness of the interaction range from 1 (rarely appropriate) to 5 (completely appropriate). Appropriateness encompasses affect, conversational skills, echolalia, and eye contact.

Teaching Task. Each individual in the dyad was instructed to teach his/her peer how to make something. The choices offered were an origami cat, a Tinker Toys construction, or a drawing, and each child chose one. HFA adolescents always went first. Each choice came with a set of step-by-step instructions that only the teacher was allowed to see. Each child was instructed, “For each one there are directions the teacher has to follow. The teacher’s job is to make sure the other person follows along with them so you both complete the project. The teacher can get the student to follow along by doing just about anything they want, but there are two rules: the teacher cannot touch the materials of the student and the student cannot look at the instructions.” Videos were coded for frequency of looks at the peer, frequency of showing actions, and frequency of verbal directives. Looks at the peer include any time the child pauses before moving to the next step or any time the child looks at their peer or the peer’s materials. Showing actions include holding up an item or pointing — any physical indication to the peer of

what to do. A verbal directive was defined as any spoken instructions to the peer, including simply reading the steps aloud. A global rating of teaching efficacy was also coded from this task, on a Likert scale ranging from 1 (poor teaching; no attempts at helping peer; simply completing task as if peer was not there; poor self-monitoring) to 5 (frequent checks and attempts to make sure peer was following along; excellent self-monitoring).

Teamwork Task. Each dyad was instructed to compose a list of the ten best movies ever made. The dyad was instructed, “The last thing you’re going to do is make a list together of the top ten movies ever made. Here’s one piece of paper and one pencil. So at the end you should have one list with ten movies on it that you both agree on.” Videos were coded for frequency of suggestions made and appropriateness. Suggestions made included ideas of movies to include on the list and ideas on how to complete the task itself. Appropriateness was a global code rated on a Likert scale from 1 (completely inappropriate interaction in terms of affect and response to peer’s suggestions) to 5 (totally appropriate interaction in terms of affect; appropriately making suggestions or accepting peer’s suggestions).

CHAPTER 3: RESULTS

Descriptive Statistics

All analyses were completed using SPSS Version 19. Descriptive statistics, including means and standard deviations for primary study variables, are presented separately for HFA and COM participants in Table 1. The normality of the primary study variables was examined separately by diagnostic group. All variables had acceptable values of skew and kurtosis (± 3), with the exception of COM participants' self-reported SASC-R FNE and observed eye contact. FNE had high values of kurtosis only, displaying a relatively flat distribution, with FNE scores equally spread across the lower range of scores (1 to 2 on a 5-point scale). Eye contact had high values of both skew and kurtosis. COM participants' eye contact was negatively skewed, such that most participants were observed to have high eye contact (5 on a 5-point Likert scale). These non-normal distributions were not transformed for subsequent analyses because they were of a restricted range. A transformation was expected to provide the same results, and since the distributions were in the expected direction, no further steps were taken.

Preliminary Analyses

Preliminary analyses were conducted to examine age and IQ matching for dyads (see Table 2). Paired-samples *t*-tests were conducted to determine whether there were significant differences between HFA and COM dyad members' ages and verbal IQs. Results indicated trend level differences in verbal IQ, $t(38) = -2.14, p = .06$. HFA participants ($M = 103.31, SD = 15.42$) tended to have lower verbal IQs than COM participants ($M = 107.74, SD = 11.61$). In addition, there were significant differences in age within the dyads, $t(38) = -2.14, p = .04$. HFA participants ($M = 12.52, SD = 2.64$)

were significantly younger than their COM dyad partners ($M = 13.06$ years, $SD = 2.14$). Therefore, age and IQ were controlled for in all between group comparisons.

Bivariate correlations, presented in Table 3, were conducted separately by diagnostic group to examine whether demographic (age) or diagnostic (verbal IQ, autism symptom severity) variables correlated with primary variables. In addition, analyses of variance (ANOVAs) were conducted to examine whether gender related to primary variables. COM participants' age and HFA participants' IQ were positively correlated with social competence. COM participants' IQ was negatively correlated with NRI friendship quality. Therefore, age and IQ were covaried in all within group analyses. Importantly, gender and symptom severity were not significantly related to any variables.

Hypothesis Testing

Hypothesis 1: Relative to COM participants, HFA participants will a) have higher self- and parent-reported social anxiety, b) have lower self-reported friendship quality, and c) exhibit lower levels of social competence.

Separate multivariate analyses of covariance (MANCOVA) were conducted with diagnostic group as the between subjects factor to examine mean differences between HFA and COM participants on all individual dimensions of social anxiety, friendship quality, and social competence, while controlling for age and verbal IQ. Post hoc univariate comparisons were conducted for all significant MANCOVAs to identify specific dimensions on which diagnostic groups differed. The first MANCOVA was conducted to examine group differences on self-reported social anxiety, including the three SASC-R dimensions (SAD-N, SAD-G, FNE) and the MASC Social Anxiety dimension. There was a significant multivariate effect of diagnostic group, Wilks's $\Lambda =$

.823, $F(4, 66) = 3.58$, $p = .011$, partial $\eta^2 = .18$. Post hoc univariate comparisons revealed diagnostic group differences on all self-reported social anxiety subscales, such that HFA participants reported higher levels of anxiety than did COM participants (see Table 1). In a second MANCOVA, significant differences were found on the three parent reported social anxiety subscales of the SASC-R, Wilks's $\Lambda = .659$, $F(3, 67) = 11.53$, $p < .001$, partial $\eta^2 = .34$. Parents of HFA participants reported higher levels of child social anxiety than parents of COM participants on all SASC-R subscales (see Table 1).

Next, group differences were examined among individual dimensions of self-reported friendship quality separately on the FQS and the NRI (see Table 1). Significant differences were found among all FQS dimensions, Wilks's $\Lambda = .762$, $F(5, 69) = 4.30$, $p = .010$, partial $\eta^2 = .24$, and among all NRI dimensions, Wilks's $\Lambda = .755$, $F(7, 59) = 2.73$, $p = .016$, partial $\eta^2 = .25$. On the FQS, COM participants reported significantly higher companionship, help/aid, and security than HFA participants. There was a trend for COM participants to have higher closeness than HFA participants, and no significant differences between groups on conflict. COM participants reported higher friendship quality on all dimensions of the NRI than did HFA participants.

Finally, group differences were examined on observed dimensions of social competence during the peer interaction task including eye contact, conversational efficacy, and appropriateness during the Get to Know You Task, and appropriateness during the Teamwork Task. There was a significant diagnostic group difference, Wilks's $\Lambda = .687$, $F(4, 67) = 7.64$, $p < .001$, partial $\eta^2 = .31$. COM participants were rated as higher on all dimensions of competence than were HFA participants (see Table 1).

Hypothesis 2: Friendship quality will partially mediate the relation between Social Anxiety and observed Social Competence.

In order to reduce the number of variables analyzed in the mediation analysis for Hypothesis 2, interrelations among variables assessing each of the primary constructs (social anxiety, friendship quality, and social competence) were examined separately by diagnostic group using Principal Component Analysis (PCA; Abdi & Williams, 2010). PCA is a dimension-reduction tool used to reduce a set of (possibly) correlated variables into a smaller number of uncorrelated variables called principal components. The first principal component accounts for as much of the variability in the data as possible, and each subsequent component accounts for as much of the remaining variability as possible. The most common rotation, a Varimax rotation, was used to make results easier to interpret. One factor was expected to emerge for each of the primary constructs in this study.

First, relations among the self- and parent-reported SASC-R subscales and self-reported MASC Social Anxiety factor were examined to create a composite score of social anxiety. However, two separate factors of social anxiety emerged for both diagnostic groups. Factors were included if their eigenvalues were above 1. Individual dimensions were included if factor loadings were above 0.4. All self-reported social anxiety subscales (SAD-N, SAD-G, FNE, and MASC Social Anxiety) loaded onto a single factor labeled self-reported social anxiety. All parent-reported social anxiety subscales (SAD-N, SAD-G, and FNE) loaded onto a separate factor labeled parent reported social anxiety.

Second, relations among the NRI and FQS subscales were examined separately by diagnostic group to create a composite score of friendship quality. Two separate factors of friendship quality emerged for both the HFA and the COM groups. Eight subscales of the NRI (Companionship, Instrumental Aid, Intimacy, Nurturance, Affection, Admiration, Reliable Alliance, and Social Support) loaded onto the first factor, labeled NRI friendship quality, and four subscales of the FQS (companionship, help/aid, security, and closeness) loaded onto a second factor, labeled FQS friendship quality.

Third, relations among the behavioral observation variables were examined to create a composite score of social competence. One factor emerged, which included eye contact, conversational efficacy, and appropriateness of interaction during the Get to Know You Task, and appropriateness during the Teamwork Task, and serves as an index of social competence.

All primary variable composites used for mediation testing were created by standardizing (creating z-scores separately by diagnostic group) and averaging the variables for each component identified in the PCA. Partial correlations among primary variables and covariates are presented for HFA and COM participants in Table 4.

Regression analysis is a statistical method that allows for the examination of potential mechanisms leading to an outcome. To test the mediation model proposed by Hypothesis 2, the INDIRECT macro for SPSS (Preacher & Hayes, 2008) was used. Direct and indirect effects were estimated, controlling for covariates, and the bias-corrected bootstrapped confidence intervals for the indirect effect were calculated. Bootstrapping involves repeatedly sampling from the dataset and estimating the indirect effect in each resampled dataset. By repeating this process hundreds of times, many

estimates of the indirect effects are obtained and are used to construct confidence intervals for the indirect effect. This method provides increased sensitivity to detecting effects compared to more traditional methods such as Baron and Kenny (1986) or the Sobel test. Further, this method is recommended for small sample sizes (Preacher & Hayes, 2008).

Analyses were conducted separately for each diagnostic group to obtain discrete path coefficients modeling the mediation for HFA and COM participants independently, in contrast to conducting a regression analysis with diagnostic group as an additional predictor. Additionally, separate regression analyses were conducted for self-reported child social anxiety and parent reported child social anxiety, and for NRI friendship quality and FQS friendship quality, as these emerged as separate dimensions through PCA. Therefore, four mediation models were tested within each diagnostic group. The first step tested whether the independent variable (IV; social anxiety) significantly predicted the dependent variable (DV; social competence), while controlling for covariates (i.e., age and verbal IQ). The second step tested whether the independent variable (social anxiety) significantly predicted the hypothesized mediator (friendship quality). If a significant association between the independent variable and the mediator was established, the third step tested whether the hypothesized mediator (friendship quality) significantly predicted social competence while controlling for social anxiety. Social anxiety served as the independent variable, friendship quality served as the mediator, and social competence served as the dependent variables in four separate models. In order to examine these relations independent of age and verbal IQ, these variables were included as covariates in all models.

HFA group

For HFA participants, neither self-reported nor parent-reported social anxiety (IV) significantly predicted NRI or FQS friendship quality (M) or social competence (DV) when controlling for age and verbal IQ. Because there was no significant association between the independent variable and either the mediator or the criterion, the third step of mediation analysis was not necessary. Path estimates are displayed in Figure 1.

COM group

Model 1: Self-reported social anxiety did not significantly predict social competence. Self-reported social anxiety predicted NRI scores at trend level, $\beta = -.34$, $t(30) = -1.97$, $p = .06$. Given the lack of association between the IV and the DV, the mediation analysis was terminated.

Model 2: Self-reported social anxiety did not significantly predict social competence. Self-reported social anxiety significantly predicted FQS scores, $\beta = -.35$, $t(34) = -2.19$, $p = .04$. Because the first step was not fulfilled, no further analyses were conducted.

Model 3: Parent reported social anxiety significantly predicted observed social competence, $\beta = -.45$, $t(31) = -3.16$, $p < .01$. Parent reported social anxiety did not significantly predict NRI scores. Because the mediator was not predicted by the IV, the third step was not necessary.

Model 4: Parent reported social anxiety significantly predicted observed social competence, $\beta = -.45$, $t(31) = -3.16$, $p < .01$. Parent reported social anxiety significantly predicted FQS scores, $\beta = -.35$, $t(32) = -2.27$, $p = .03$. The third step for Hypothesis 2 testing was to test whether FQS friendship quality significantly predicted social

competence, while controlling for parent reported social anxiety (in addition to the covariates of verbal IQ and age). FQS predicted social competence at trend level when controlling for parent reported social anxiety, $\beta = .27$, $t(30) = 1.7$, $p = .098$, and did not predict unique variance over parent reported social anxiety. Path estimates are displayed in Figure 2. Based on 1000 bootstrap samples, the 95% confidence interval for FQS friendship quality as a mediator was $-.38$ to $.02$. This range represents the upper and lower limits of the hypothetical indirect effect calculated with the 1000 bootstrap samples. Because the confidence interval contained zero, mediation was not supported.

CHAPTER 4: DISCUSSION

The goal of this study was to examine interrelations among social anxiety, friendship quality, and social competence in higher functioning children and adolescents with autism and their typically developing peers. Diagnostic group differences were found on mean scores of the primary variables, but distinct associations were evident among social anxiety, friendship quality, and social competence for HFA adolescents and for COM adolescents. Thus, there may be different mechanisms supporting social competence in individuals affected with autism versus typically developing individuals.

Diagnostic Group Differences

The first aim of the study was to examine mean differences between HFA and COM participants in each of the primary variables. Consistent with the first hypothesis and past research (e.g., Gillott, Furniss, & Walter, 2001; Bauminger & Kasari, 2000; Kenworthy et al., 2010), HFA participants were rated as more socially anxious, self-reported lower quality friendships, and displayed less social competence in the laboratory. The observed social competence measure used in this study was unique to this study, as previous studies have relied on parent- or teacher-report measures that often assess only a few behaviors (e.g., Reynolds, Bendixen, Lawrence, & Lane, 2011) or measures that do not explicitly assess social competence per se (e.g., Stagnitti, O'Connor, & Sheppard, 2012). In contrast, the behavioral observation in this study directly captured many aspects of social competence that have been identified as important for children with intellectual and developmental disabilities, such as eye contact, reciprocity during a conversation, and flexibility of affect (Cook & Oliver, 2011).

Informant Agreement

Also consistent with past literature (Bellini, 2004; White et al., 2012), higher social anxiety among HFA participants was reported by both children and parents. In addition, moderate, albeit non-significant, positive correlations were found between parent and child anxiety reports, and have been found in previous literature (Bellini, 2004). This suggests that HFA individuals possess insight into their own internalizing problems to the same degree as COM individuals. During late childhood and into adolescence, agreement on internalizing problems is generally lower than agreement on externalizing problems (Collishaw, Goodman, Ford, Rabe-Hesketh, & Pickles, 2009). This may result in part because during this developmental period, children spend less time with their parents and may not discuss anxiety with their parents (van der Ede & Verhulst, 2005). The moderate associations between self- and parent report in both groups are consistent with emerging research on informant discrepancies, which has been interpreted to indicate that the unique perspectives of typically and atypically developing children and their parents may contribute different, but not erroneous, reports on behavior (Lerner, Calhoun, Mikami, & De Los Reyes, 2012).

Measurement Consistency across Groups

Another finding that supported the validity of this study's measures was that the PCA factor structures of composite variables were similar for HFA and COM participants, identifying the same number of factors and comparable factor loadings for both groups. Regardless of diagnostic group, the discrete components of social anxiety, friendship quality, and social competence formed like patterns, indicating comparable configurations of individual dimensions within each composite across diagnostic groups.

This suggests that the measures employed in this study for each of the primary composite variables measured the same constructs for each diagnostic group. For both groups, self-reported and parent-reported social anxiety created separate components, suggesting that, despite moderate agreement between raters, parents and their children answer these questions in different ways. This has been shown in previous studies (Achenbach, McConaughy, & Howell, 1987), and corresponds with the previously discussed moderate but non-significant correlations found between self- and parent report measures in this study. The similarity of factors for both diagnostic groups again supports the validity of youth ratings.

Interestingly, for both groups, the FQS and the NRI formed separate factors, suggesting that the two measures of friendship quality assess different facets of friendship. Although the two questionnaires ask similar questions, the responses requested of participants glean different types of information. For example, the FQS item, “My friend and I spend all of our free time together,” can be answered on a numbered scale that ranges from “not true” to “really true.” In contrast, the NRI item, “How much free time do you spend with [this person]?” can be answered “little or none,” “somewhat,” “very much,” “extremely much,” or “the most.” The FQS assesses more global aspects of friendship, while the NRI measures more specific, quantitative aspects of a friendship.

Finally, it is important to note that the factor structure for observed social competence was identical for HFA and COM groups, indicating that participants in both diagnostic groups were observed to have comparable dimensions of the behaviors

observed during the peer interaction. This provides validity for this behavioral measure, and supports the operationalization of social competence in this study.

Interrelations among Social Anxiety, Friendship Quality, and Social Competence

The second aim of this study was to examine the interrelations among social anxiety, friendship quality, and social competence, and to assess whether the relations were comparable for both diagnostic groups. Analyses revealed very different results for HFA versus COM individuals. Consistent with hypotheses and the previous literature, COM participants with higher parent-reported social anxiety reported lower quality friendships and displayed significantly lower social competence with an unfamiliar peer (Ginsburg, La Greca, & Silverman, 1998; Smári, Pétursdóttir, & Þorsteinsdóttir, 2001). These findings suggest that social anxiety may impact the development of social competence and/or prevent children from implementing the skills that they possess when in a new or anxiety-provoking situation. Consistent with this interpretation, the literature has shown that children and adolescents with social anxiety often avoid social situations, thereby limiting the opportunities they have to interact with, learn from, and form friendships with peers (La Greca, Dandes, Wick, Shaw, & Stone, 1988). Despite these bivariate associations, friendship quality did not significantly mediate the relation between social anxiety and social competence. This may suggest that social anxiety and friendship quality have independent effects on social competence, or may be due to the relatively small sample and the inclusion of covariates.

In contrast to hypotheses and the findings for the COM model, the HFA model was non-significant, although several correlations were found at trend level and were in the expected direction. Although some researchers have questioned the validity of HFA

individuals' self-reports (e.g. Nicpon, Doobay, & Assouline, 2010; Johnson, Filliter, & Murphy, 2009), invalid reporting seems unlikely in this study. Research has shown that HFA adolescents can be reliable reporters on their own experiences, and that their reports correlate modestly with parent reports (Shipman, Sheldrick, & Perrin, 2011). Moreover, there is evidence that HFA children and adolescents are adept at providing accurate responses of friendship quality. Solomon, Bauminger, and Rogers (2011) used the same measure of friendship quality used in this study to examine consistency of responses between HFA children and their friends. The authors found no significant differences between the responses of HFA children and those of their friends on any subscale of the FQS. This agreement suggests that the reports of HFA children and adolescents can be considered valid indices of friendship quality.

Importantly, neither parent nor self-reported social anxiety correlated with social competence in the HFA group. For HFA individuals, social anxiety may serve mixed functions in that it may confer both risk and protection in the development of social competence. For example, fear of negative evaluations may encourage HFA individuals to self-monitor and modify their behavior during a social interaction. HFA individuals who are self-conscious of their social deficits may make an effort to adjust their behaviors in a social interaction in order to mitigate negative social judgments from peers, a finding that has prompted interventions targeted at increasing self-monitoring (Loftin, Odom, & Lantz, 2008). An excess of self-focused attention may be debilitating for TD children and adolescents, but given the social deficits inherent in autism, it may instead aid some, but not all, HFA individuals. This suggests that a broader model of psychosocial factors leading to social competence should be examined. Theory of mind

and aspects of temperament, including effortful control and emotion regulation, have been theorized to influence social competence in HFA, as well as typically developing, children and adolescents. In addition, these constructs have been found to be correlated with observed social competence in HFA children (Usher & Henderson, 2012). There is a possibility that these variables account for much of the variance in social competence, and should be taken into consideration in a model like the one hypothesized in this study.

Limitations

One limitation to this study was sample size, with each diagnostic group consisting of 39 participants. The small sample size limited the power available for analyses, reducing the likelihood of finding a significant effect. Despite the limited power, correlation analyses revealed moderate coefficients in the expected directions of effect. Ongoing enrollment of participants will provide greater power to detect differences.

Another limitation was the use of concurrent data (i.e., data obtained at a single point in time) in the mediation model. Temporal precedence of the mediator is a major assumption of mediation analysis, meaning that the mediator's influence must occur before the outcome variable (MacKinnon, 2008). In this study, the concurrent assessment of all variables limited the ability to make causal assumptions about the effects of social anxiety and friendship quality on social competence. The possibility of detecting a significant effect may have been limited, because the IV and mediator may not have had sufficient time to affect the DV. Also, because all data were collected at the same time point, other models of effects may be viable alternatives to the one tested here. Possible alternative models include one in which social competence acts as the IV affecting an

individual's friendship quality, which in turn affects social anxiety. Alternatively, friendship quality may affect social anxiety, which in turn affects social competence. Despite the limited ability to make causal statements, this study contributed to a greater understanding of relations among these variables in both diagnostic groups.

The use of a sample of higher functioning individuals with autism limits the generalizability of results to the broader autism population. Additionally, the assessment of social competence may be particularly difficult in HFA individuals, who have generally undergone intensive therapy and intervention for social skills (for a review, see Cappadocia & Weiss, 2011). It is possible that some HFA participants may have received extensive social skills interventions, and therefore, may have displayed adequate skills in the interaction without necessarily being truly socially competent. However, for this study, the behavioral observation coding scheme was designed to take into consideration qualities like the flexibility versus rigidity of the interaction. This, together with the unfamiliar peer paradigm, creates a reasonably good measure of true social competence. In addition, the distribution of social competence in the HFA group was normal, providing support for the notion of heterogeneity in HFA individuals and indicating that not all of the participants displayed the same level of competence. Future studies should take the quantity and quality of previous therapy and interventions into account as a potential predictor of social competence.

Future Directions

Further research is needed to better understand which particular aspects of friendship are most important, and which are most closely related to social competence development, for HFA and TD children and adolescents. In this study, the lack of

significant differences between groups on FQS conflict and closeness indicates that these qualities are common to both groups – they both have relatively low conflict and feel moderately close to their best friends. Interestingly, Bauminger and Kasari (2000) also found no significant difference between HFA and TD children and adolescents on FQS closeness, in that both groups reported that they felt highly close to their friends. However, additional characteristics of HFA friendships need additional research to obtain objective assessments of these relationships. This could be accomplished with a laboratory interaction paradigm in which HFA participants bring their friends and complete a similar peer interaction procedure to the one used in this study. These observational measures, along with the reports of the target child and the friend, could then be used to assess consistency and potentially create a multi-source composite of friendship quality.

In addition, further research could expand on the contexts in which social competence is assessed. For HFA individuals, interacting with an unfamiliar peer one-on-one may not be the best measure of their skills. HFA children and adolescents may perform better during interactions with adults than with their peers, because their social anxiety may be increased when interacting with peers. This may arise because of the pattern of negative peer interactions that individuals with autism experience over the course of childhood and through adolescence (Church, Alisanski, & Amanullah, 2000). Additionally, adults offer greater predictability and additional support than peers do. Social competence is a complex construct that may be manifested in different ways in various contexts (Lillvist et al., 2009), so observation of HFA individuals' social competence with an adult may reveal better social competence outcomes than

interactions with peers. Still, this study's observation of social behavior in the context of a peer interaction is important, because this type of behavior can be generalized to many novel social situations that individuals face in their everyday lives.

Another aspect of social competence that merits further research is the perception that an individual has of how he or she is viewed by others. Insight into HFA individuals' perceptions of what their social partners think of them may be helpful to identify factors influencing social competence. Few studies have examined the accuracy of these "metaperceptions" in typically developing youth (e.g., Malloy, Albright, and Scarpati, 2007), and no previous study has directly examined metaperceptions in individuals with autism. Research is lacking in the understanding of what social cues higher functioning children and adolescents with autism perceive, and how they interpret and respond to these cues. Previous research in typically developing children suggest that children learn from a young age to understand representations of their own and of other's behavior, as well as the links between their behavior and that of others (Brownell, Ramani, & Zerwas, 2006). For example, do socially anxious individuals believe that their peers are detecting their anxiety, and is this metaperception influencing their social behavior? Insight into these and related questions can provide researchers with a greater understanding of the way that social anxiety and social competence function in HFA and TD individuals. Interventions targeting social anxiety, friendship quality, and social competence in HFA are needed, and a better view of the way that these constructs relate to one another will aid in the development of effective services.

TABLES

Table 1. Means and standard deviations for all measures.

Measure Name	HFA			COM		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Self-reported Social Anxiety						
SASC-R SAD-N	39	2.72	0.90	38	2.21	0.73
SASC-R SAD-G	39	2.44	0.84	38	1.76	0.70
SASC-R SAD-FNE	39	2.33	1.01	38	1.88	0.75
MASC Social Anxiety Total	37	53.76	10.59	37	47.54	8.86
Parent-reported Social Anxiety						
SASC-R SAD-N	37	3.12	0.90	36	2.02	0.82
SASC-R SAD-G	37	2.54	0.98	36	1.65	0.65
SASC-R FNE	37	2.87	1.09	36	1.77	0.77
NRI Friendship Quality						
Companionship	34	3.36	1.06	35	3.78	0.87
Instrumental Aid	34	2.71	1.13	35	3.30	0.91
Intimacy	34	2.63	1.21	35	3.30	1.20
Nurturance	34	3.09	1.07	35	3.53	0.95
Affection	34	3.30	1.14	35	3.95	1.02
Admiration	34	3.45	1.16	35	3.70	1.01
Reliable Alliance	34	3.46	1.10	35	4.13	0.86
Social Support	34	3.14	0.97	35	3.67	0.79

(Table 1 continues)

(Table 1 continued)

Measure Name	HFA			COM		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
FQS Friendship Quality						
Companionship	38	3.31	0.86	39	3.98	0.80
Conflict	38	2.00	0.99	39	2.33	0.85
Help/Aid	38	3.51	0.97	39	4.36	0.67
Security	38	3.61	0.78	39	4.05	0.53
Closeness	38	3.78	0.79	39	4.04	0.69
Observed Social Competence						
Get to Know You Eye Contact	38	3.55	1.48	38	4.74	0.72
Get to Know You Conversational Efficacy	38	3.71	1.23	38	4.13	1.14
Get to Know You Appropriateness	38	3.16	1.26	38	4.24	1.05
Teamwork Task Global Appropriateness	37	3.78	0.95	37	4.59	0.60

Note. SASC-R = Social Anxiety Scale for Children-Revised. SAD-N = Social Avoidance and Distress-New. SAD-G = Social Avoidance and Distress-General. FNE = Fear of Negative Evaluations. MASC = Multidimensional Anxiety Scale for Children. Scores for the MASC represent standardized *T* scores (*M* = 50, *SD* = 10). Scores on remaining variables represent individual means.

Table 2. Descriptive statistics.

	Diagnostic Group				Dyadic matching <i>t</i> value	Group differences <i>F</i> value
	HFA		COM			
	<i>Mean (SD)</i>	<i>Range</i>	<i>Mean (SD)</i>	<i>Range</i>		
Gender	34 M, 5 F	-	34 M, 5 F	-	-	-
Age in years	13.85 (2.80)	9.58-18.25	14.14 (2.36)	9.58-17.75	-.77	.25
Verbal IQ	103.31 (15.42)	77-136	107.74 (11.61)	81-136	-1.94†	2.06
ADOS	11.79 (3.88)	3-21	2.66 (3.64)	0-15	9.89***	113.17***
SCQ	20.05 (5.69)	7-33	5.54 (3.63)	0-20	12.51***	180.26***
ASSQ	27.23 (7.05)	12-42	4.77 (4.45)	0-23	17.16***	283.02***

Note. ADOS = Autism Diagnostic Observation Schedule; SCQ = Social Communication Questionnaire; ASSQ = Autism Spectrum Screening Questionnaire.

† $p < .10$. * $p < .05$. *** $p < .001$.

Table 3. Correlations among study variables.

	1	2	3	4	5	6	7	8	9
1. Age	-	.06	.00	-.10	-.04	.08	-.25	.12	.23
2. Verbal IQ	-.01	-	-.20	-.09	-.08	-.04	-.30†	-.19	.35*
3. Social Communication Questionnaire	-.06	.19	-	.35*	.13	.15	-.05	-.17	.21
4. Autism Symptom Severity Questionnaire	.09	.19	.23	-	.16	.14	.16	-.07	.10
5. Self-reported social anxiety composite	-.41*	-.03	.12	.06	-	.32†	.04	-.02	-.13
6. Parent reported social anxiety composite	-.10	.04	.18	.25	.27	-	-.07	.13	-.08
7. NRI composite	.21	-.40*	.04	.04	-.33†	-.20	-	.63**	.05
8. FQS composite	.23	-.07	-.16	-.05	-.45**	-.35*	.64*	-	.07
9. Social competence composite	.35*	.00	.00	.00	-.18	-.45**	.22	.49**	-

Note. Correlations for HFA participants are reported in the shaded region above the diagonal; correlations for COM participants are reported below the diagonal. NRI = Network of Relationships Inventory; FQS = Friendship Quality Scale.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4. Partial correlations between primary variables, controlling for age and verbal IQ.

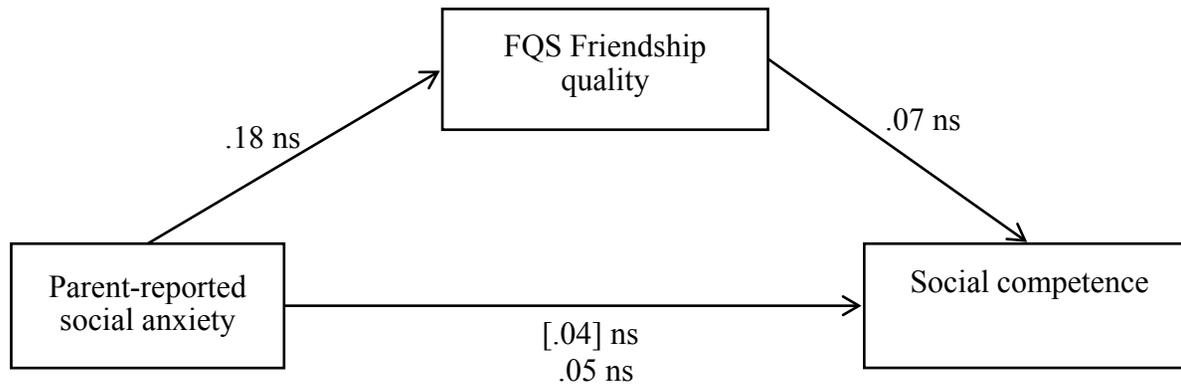
	1	2	3	4	5
1. Self-reported social anxiety composite	-	.32 [†]	.10	.00	-.09
2. Parent reported social anxiety composite	.24	-	.01	.30	.07
3. NRI composite	-.31 [†]	-.25	-	.63 ^{**}	.11
4. FQS composite	-.28	-.24	.58 ^{**}	-	.01
5. Social competence composite	.00	-.31	.29	.30	-

Note. Correlations for HFA participants are reported in the shaded region above the diagonal; correlations for COM participants are reported below the diagonal. NRI = Network of Relationships Inventory; FQS = Friendship Quality Scale.

[†] $p < .10$. ^{**} $p < .01$.

FIGURES

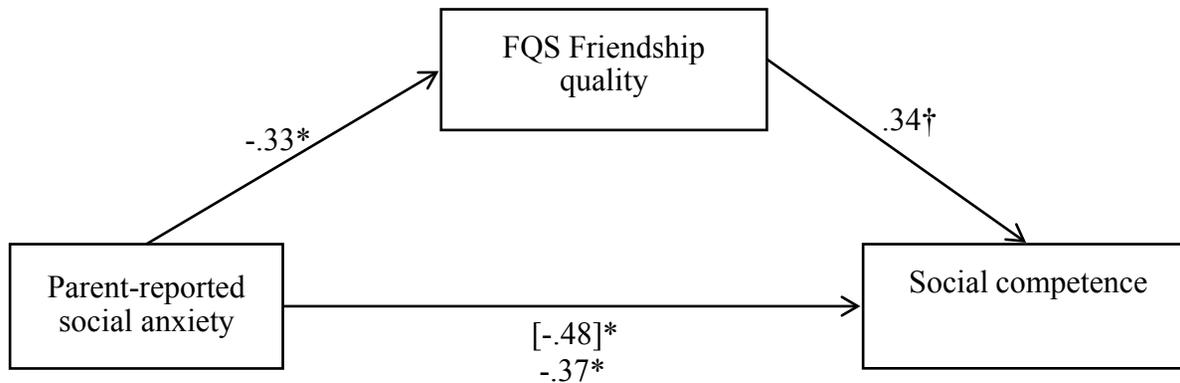
Figure 1. Unstandardized path coefficients for HFA group mediation model.



Note. For direct effect, coefficient in brackets does not include mediator in regression analysis; coefficient without brackets includes mediator in regression analysis. FQS = Friendship Quality Scale.

ns = not significant

Figure 2. Unstandardized path coefficients for comparison group mediation model.



Note. For direct effect, coefficient in brackets does not include mediator in regression analysis; coefficient without brackets includes mediator in regression analysis. FQS = Friendship Quality Scale.

$^\dagger p < .10$. $^* p < .05$.

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