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UNIVERSITY OF CALIFORNIA  
RIVERSIDE

Examining the Relations Between Psychopathology and Social Skills in  
Children with ASD

A Dissertation submitted in partial satisfaction  
of the requirements for the degree of

Doctor of Philosophy

in

Education

by

Geovanna R. Rodriguez

June 2017

Dissertation Committee:

Dr. Jan Blacher, Chairperson

Dr. Cathleen Geraghty

Dr. Keith Widaman

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The Dissertation of Geovanna R. Rodriguez is approved:

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Committee Chairperson

University of California, Riverside

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## **Dedication**

This work is dedicated to my family, particularly my parents, Delia and Octaviano. Thank you for your endless sacrifices, support, and for teaching me the value of perseverance, humility, and compassion. I would also like to extend my gratitude to the village of trailblazing women that worked along my side at the SEARCH Family Autism Resource Center. You all became my mentors, my friends, my sounding board, and my family. I could not have done this without your support and encouragement.

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Finally, to all the families who shared their story with me and participated in this research, this work could not have been possible without your time and commitment. Thank you for allowing me to be a part of your lives and for your vested interest in improving the lives of your children. You all are truly the most valuable puzzle piece.

## ABSTRACT OF THE DISSERTATION

### Examining the Relations Between Psychopathology and Social Skills in Children with ASD

by

Geovanna R. Rodriguez

Doctor of Philosophy, Graduate Program in Education  
University of California, Riverside, June 2017  
Dr. Jan Blacher, Chairperson

This study examined the relations between child internalizing behavior problems and social competence in a sample of young children (N=166) with autism spectrum disorders (ASD) as they transitioned to early schooling. Previous literature suggested higher rates of comorbid psychopathology in this population of children; however, a limited number of studies have explored the influence of behavior problems and their effect on the social behaviors of children with ASD across time. Further, methodological challenges in the assessment of behavioral and social impairments in students with ASD have increased the utility of multi-informant data when examining these relationships. Results indicated that parents and teachers of children with ASD demonstrate poor agreement on measures of social and behavioral functioning. Additionally, parent and teacher ratings of social functioning collected at the onset of the study were shown to be a significant predictor of children's social skills at the end of their participation (18 months). The study also examined the relation between internalizing behavior problems and ASD symptomatology, and the impact of both of these on the growth of children's social skills.

Although results indicated that internalizing behavior problems and ASD symptomatology did not significantly predict social skills growth over time, child behavior problems were shown to predict children's initial status of social skills at the start of the school year.



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## Examining the Relations Between Psychopathology and Social Skills in Students with ASD

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by a range of socio-communicative deficits, aberrant behavior patterns such as restrictive or repetitive behaviors, and an inability to engage and maintain appropriate social interactions (American Psychiatric Association, APA, 2013). The presentation and severity of ASD symptoms may prevent children from participating in social exchanges or reciprocating social overtures very early on in their development. Often, their behavior difficulties result in poor interpersonal relationships, dysregulated and maladaptive behavioral responses, and academic underperformance (Ashburner, Ziviani, & Rodger, 2010; Bauminger, Solomon, & Rogers, 2010; Macintosh & Dissanayake, 2006; Mazurek & Kanne, 2010; White & Roberson-Nay, 2009), thereby impacting their ability to thrive in rich social environments such as school.

Recent research has found that compared to children with other disabilities, children with ASD demonstrate co-occurring behavioral and emotional problems at rates much higher than typically developing youth (Baker & Blacher, 2015; Gray, Keating, & Taffe et al., 2012; Matson & Nebel-Schwalm, 2007; Macintosh & Dissanayake, 2006). Although there appears to be much variability in the symptom profiles of children with ASD, emotional and behavioral difficulties may be more pronounced, placing them at heightened risk for mental health disorders (Matson & Nebel-Schwalm, 2007). Bearing in mind the significant impairments in social functioning of children with ASD and the heightened risk of mood and emotional difficulties, the link between social functioning

and emerging psychopathology in this population presents an important area of study. To date, little work has been done in this area with young children with ASD.

Although it is widely understood that children with ASD exhibit social deficits, research has demonstrated variability in children's social competencies as well, suggesting that within group differences (i.e. how children respond or adapt to their social environments) do exist (Sigman, Ruskin, Arbelle et al., 1999). In other words, some children with ASD are able to perceive how they themselves differ from their peers, making them more attune to their social inadequacies and more at risk for anxiety and depression (Capps, Sigman, & Yirmiya, 1995; Mazurek & Kanne, 2010; Vickerstaff, Heriot, Wong, Lopes, & Dossetor, 2007). Although not typically considered to be the best reporters of their own subjective experiences, children with ASD have been shown to accurately report and reflect on their feelings of loneliness, anxiety, and interpersonal difficulties with peers (Vickerstaff et al., 2007; Zeedyk, Cohen, Eisenhower, & Blacher, 2015).

Interestingly, different presentations of ASD symptomatology may be indicative of different vulnerabilities and symptom clusters within this population that may contribute to disparate outcomes (Howlin, Goode, Hutton, & Rutter, 2004; Szatmari, Bryson, Boyle, Streiner, & Duku, 2003; Weis & Riosa, 2015). The fact that variability exists within the context of ASD renders the investigation of differences in social outcomes a particular area of interest, specifically with regard to identifying other potential variables that contribute to child socio-behavioral trajectories over time. Thus, this research study aims to contribute to the extant literature by investigating the

relationship between comorbid psychopathology, specifically clinically significant internalizing disorders, and children's overall social functioning, as perceived by different informants in the child's environment (parents and teachers). This study will also examine individual trajectories of child social behaviors over time.

### **Social Deficits in Children with ASD**

Impairments in social functioning are considered to be a hallmark feature of children with ASD, differentiating these children from the social profiles of children with other developmental disabilities (Sigman, Ruskin, Arbelle et al., 1999). Although the cognitive, behavioral, and adaptive profiles of children differ among individuals with ASD (Howlin et al., 2004; Szatmari, Archer, Fisman, Streiner, & Wilson, 1995), gross impairments in social functioning (e.g. social skills), social responsiveness, and limited social involvement are among the most noted characteristics in this population; often, these social deficits are present throughout the lifespan (Constantino, Abbacchi, Lavesser, et al., 2009; Green, Gilchrist, Burton, & Cox, 2000; Shattuck, Orsmond, Wagner, & Cooper, 2011). Adding to this deficit are difficulties in the development of social communication abilities (e.g. pragmatic and expressive use of language), which may also interfere with the ability to process social information accurately and navigate social interactions (Joseph, Tager-Flusberg, Lord, 2002; Klin, Saulnier, Sparrow, et al., 2007). Deficits in socio-communicative skills, in turn, may directly affect a child's ability to participate in meaningful social conversations, engage in verbal exchanges or joint activities with peers, and participate in play or leisurely activities, thus enhancing their

risk of peer rejection (Laws, Bates, Feurerstein et al., 2012; Macintosh & Dissanayake, 2006).

Additionally, children with ASD have been shown to demonstrate pervasive repetitive behaviors and/or restricted interests, poor eye contact, and difficulty sustaining joint attention. Joint attention has been implicated in a child's ability to develop and maintain friendships and engage in joint play activities with peers (Chang, Shih, & Kasari, 2016). Another challenge is that repetitive and stereotypical behaviors may also impact the development of important social skills during social activities with peers. Circumscribed interests and cognitive rigidity may interfere with appropriate play behavior, such that children with ASD prefer to engage in highly routinized play activities that limit the use of joint imaginative play (Honey, Leekam, Turner, & McConachie, 2007), spontaneity, and peer-centered activities (Chang et al., 2016). These atypicalities may not only dissuade peers from interacting with these children, but also preclude children from inclusion in social activities altogether, leading to isolation and peer rejection (Bauminger & Kasari, 2000; Bauminger, Shulman, & Agam, 2004).

**Variability of Social Behaviors.** Interestingly, research has implied that a child's level of social responsiveness may vary as a function of autism symptomatology and developmental status (Sigman, Ruskin, Arbelle, et al., 1999). However, studies examining within-group variation in the social profiles of children with ASD have received far less attention (Murray, Ruble, Willis, & Molloy, 2009). This has been partly attributed to the difficulties in quantifying social development in ASD and validating measures that reliably and consistently measure specific social behaviors of children,



while showing sensitivity to change over time (Murray et al., 2009; Volkmar, Carter, Sparrow, & Cicchetti, 1993). One may expect that children with less symptom impairment demonstrate more variability in their responses to social situations, development of social skills, and overall social competence compared to children with higher symptom severity.

Indeed, the psychosocial functioning of children with ASD has been shown to vary over time and across contexts, suggesting atypical social profiles and symptoms, which may be perceived differently across different informants (Nicpon, Doobay, & Assouline, 2010). This pattern has been seen in high functioning children (ages 5-11) and adolescents (ages 12-17), with adolescents showing greater adaptability to changes in their environment and less impairment on the Atypicality scale of the Behavior Assessment System for Children, Second Edition (BASC-2; Reynolds & Kamphaus, 2004). Clinical and adaptive scales showed general improvements across time in overall functioning in the adolescent group compared to their younger age peers with ASD (Nicpon et al., 2010). Children and adolescents in this study were considered to have above average intelligence (Full Scale IQ Score  $M = 122.25$ ,  $SD = 11.41$ ). Interestingly, teachers in this study were generally found to report less symptom severity in both child and adolescent groups when compared to parent reports of atypical symptoms; discrepancies were even greater in the child-aged group. Findings from this study suggest that developmental differences may not only be indicative of differences in ASD symptomatology, but may also allude to informant discrepancies in the report of children's psychosocial functioning.

Another study found that parent and teacher reports of social functioning (i.e. their perception of social functioning) varied as a function of child symptom severity (Azad, Reisinger, Xie, & Mandell, 2015). Azad and colleagues assessed the level of agreement between parents and teachers on a measure of social functioning (i.e., Social Responsiveness Scale—SRS; Constantino & Gruber, 2005) at the beginning and end of the school year. It was found that parents and teachers were more likely to agree on the social deficits (i.e., children’s *awareness, communication, cognition, motivation, mannerisms*) of more severely affected children, compared to characteristics of children who were considered less impaired. By the end of the school year, parents and teachers of the more impaired children agreed on all syndrome scales (including the SRS total score, which measures overall social impairment). In contrast, parents and teachers of less affected children showed no agreement at the beginning or throughout the school year, showing agreement only on child social motivation at the end of the school year (Azad et al., 2015). Moreover, this and other studies suggest that respondent perceptions may be susceptible to contextual influences (e.g. differences in symptom manifestations across academic and home environments) and variability in the symptom and behavioral profiles of children (Murray et al., 2009). Gaining reliable estimates on the behavioral profiles of children with ASD and how behavior problems predict and relate to changes in social behaviors is an important focus of this study.

### **Prevalence of Psychopathology**

Evidence from previous studies suggests that co-occurring behavior problems have a compound impact on the socialization experiences of children with ASD. The

emergence of mental health issues in ASD is no longer considered by researchers to be relatively uncommon. Various studies have demonstrated a higher prevalence for co-occurring psychiatric conditions such as depression, bipolar disorder, anxiety, ADHD, oppositional-defiant disorder, and mood dysregulation (Kanne, Abbacchi, & Constantino, 2009; Kim, Szatmari, Bryson, et al., 2000; Leyfer, Folstein, Bacalman et al., 2006; Mayes, Calhoun, Murray, Ahuja, & Smith, 2011; Matson & Nebel-Schwalm, 2007). Alarming, recent epidemiological studies have reported prevalence rates within ranges of 46%-74% for the presence of one or more psychiatric disorders in individuals with ASD (Brereton, Tonge, & Einfeld, 2006; Mannion, Leader, & Healy, 2013; Simonoff, Pickles, Charman, et al., 2008).

Most studies to date have focused on mental health outcomes primarily in adolescent and adult populations, with a limited number of studies examining the prevalence of psychopathology in early to middle childhood. High rates of behavior and emotional problems have been shown to emerge at an early age in children with ASD and are likely to have an adverse impact on core ASD symptoms and social adjustment well into adolescence and adulthood (Brereton, Tonge, & Einfeld, 2006). One study examined the prevalence of psychiatric disorders in early childhood within a sample of preschool-aged children with (N = 182) and without PDD-NOS (N = 135) referred to an outpatient psychiatric clinic (Gadow, DeVincent, Pomeroy, & Azizian, 2004). Both parents and teachers, who provided the ratings of psychiatric symptoms, endorsed more symptoms if the child was diagnosed with PDD rather than non-PDD (Gadow et al., 2004).

**Externalizing Behaviors.** Children with developmental delays are more likely to exhibit higher rates of externalizing behavior concerns (Baker, Blacher, Crnic, & Edelbrock, 2002; Baker, Neece, Fenning, Crnic, & Blacher, 2010; deRuiter, Dekker, Douma, Verhulst, & Koot, 2008) compared to children in the general population. Externalizing symptom profiles (i.e., impulsivity, aggression, and inattention) and other maladaptive behaviors have been shown to vary as a function of age, gender, IQ, and verbal ability, particularly in children with ASD (Hartley, Sikora, & McCoy, 2008; Seltzer, Shattuck, Abbeduto, & Greenberg, 2004). These challenging behaviors have been shown to predict such outcomes as children's social maladjustment, adaptive living skills, and parental stress and well-being (Eisenhower, Baker, & Blacher, 2005; Howlin, Goode, Hutton, & Rutter, 2004; Seltzer et al., 2004). Not surprisingly, the presence of externalizing behaviors in children with ASD has typically been associated with greater ASD symptom severity and lower intelligence.

Studies examining the developmental trajectories of externalizing behaviors in typically developing children, suggest that externalizing behaviors tend to decline and stabilize over time (Bongers, Koot, Van Der Ende, & Verhulst, 2004). Further, some research has highlighted the fact that externalizing behaviors often co-occur with internalizing behaviors (Eisenberg et al., 2001). Attention related difficulties (i.e., attentional control/regulation) are among the most commonly reported symptoms endorsed by both parents and teachers that are shared between internalizing and externalizing behavioral profiles in children (Eisenberg et al., 2001). Although internalizing and externalizing behavior problems appear to share overlapping symptom

presentations, the manifestation of symptoms that characterize each behavioral profile typically differ with regard to emotion and behavioral regulation (Eisenberg et al., 2001). Internalizing and externalizing children have been shown to differ more with regards to impulsive behaviors and less with regards to inattention (Eisenberg et al., 2001).

Few studies have examined these behaviors concurrently in young children with ASD and have typically focused on these behaviors in isolation. Studies examining the presence of maladaptive behaviors in adolescents and adults with ASD have also noted similar trajectories, with externalizing behavior problems typically declining and stabilizing over time (Shattuck et al., 2007). According to some studies, internalizing symptoms, particularly affective disorders such as depression, appear to worsen over time, with behaviors peaking in adolescence and adulthood (Seltzer, Shattuck, Abbeduto, & Greenberg, 2004).

**Internalizing Behaviors.** Anxiety-related concerns are among the most commonly reported psychiatric symptoms in children with high-functioning ASD (Bellini, 2004; Gillott, Furniss, & Walter, 2001; Kim et al., 2000; White, Oswald, Ollendick, & Scahill, 2009). As compared to typically developing children and children with learning disabilities, children with ASD are more likely to score higher on measures of anxiety (Bellini, 2004; Gillott et al., 2001). Although not yet considered to be a core diagnostic feature of autism, internalizing symptoms in ASD have long been thought to result from overlapping symptom similarities in socially inhibited behaviors (i.e., social withdrawal and peer avoidant behavior; White et al., 2009).

In one review of the literature, the prevalence of anxiety in individuals with ASD indicated that between 11% and 84% of children suffer from some form of debilitating anxiety (White et al., 2009). Even more concerning is the fact that 40-55% of individuals in these studies met clinical criteria for at least one anxiety disorder (de Bruin, Ferdinand, Meester et al. 2007; Simonoff et al., 2008; van Steensel, Bogels, & Perrin, 2011; White et al., 2009). Estimates of psychopathology continue to vary across clinical and community samples.

Further, internalizing symptoms are more likely to occur in children and adolescents with fewer ASD symptoms and higher intellectual functioning (Strang, Kenworthy, Daniolos, et al., 2012). Mayes and colleagues (2011) examined this phenomenon among a sample of 1,390 children (ages 6 to 16 years old) with ASD, typical development, and children with depression and/or anxiety. Maternal ratings of psychiatric symptoms were assessed using the Pediatric Behavior Scale (PBS; Lindgren & Koepl, 1987), which yields scores on several subscales related to psychopathology such as depression, anxiety, irritability, aggression, low self-esteem, impulsivity, and oppositional defiant disorder. Researchers in this study split the ASD sample into a high-functioning group (HFA, IQ > 80) and a low-functioning ASD group (LFA, IQ < 80). Results from this study were consistent with previous findings, such that children with ASD were consistently rated higher than typically developing children for symptoms of anxiety, depression, and irritability (Mayes, Calhoun, Murray, Ahuja, & Smith, 2011). The percentage of anxiety symptoms found in children with HFA (79%) and LFA (67%), although lower than in children diagnosed with an anxiety disorder, still exceeded the

rates of typically developing children. Despite having lower anxiety scores, children with HFA were comparable to children with anxiety on several anxiety related symptoms such as, “fearful, anxious, or worried;” “shy or timid;” “tense;” and “nervous;” suggesting similar symptom profiles between these two groups when looking at the frequency and quality of symptoms endorsed (Mayes et al., 2011). Few studies however, have examined within-group variance in anxiety among high functioning students with ASD, especially the early school years..

Unfortunately, compared to externalizing behavior problems (e.g., hyperactivity and aggression), internalizing behavior problems are less likely to be detected in schools due to the subtle and covert nature of symptoms (Whitcomb & Merrell, 2013). These behaviors are often not reliably assessed by parents and teachers, which necessitates the use of multi-informant data in the assessment of socio-emotional difficulties in youth. Yet, symptoms within the internalizing domain, such as anxiety, continue to be among the highest reported concerns among individuals with ASD. The heterogeneity within this disorder, along with the wide range of abilities and difficulties individuals present with, only add to the methodological challenges in the assessment and differential diagnosis of ASD and co-existing mental health concerns (Trammell, Wilczynski, Dale, & McIntosh, 2013). By better understanding the interplay between psychopathology and social behaviors in early childhood, we can better inform and tailor interventions aimed at treating the socio-emotional health of students with ASD, that promote positive social outcomes in later development.

## **The Link Between Behavior Profiles and Social Outcomes in ASD**

Some researchers have theorized that social skill deficits may help explain the developmental course and mechanism by which anxiety manifests itself in individuals with ASD (Bellini, 2006). In a study aimed at understanding the relationship between social functioning and anxiety in individuals with ASD (ages 12-18), Bellini (2004) found that relative to the general population and consistent with previous findings, adolescents with ASD experienced higher levels of social anxiety (49% of sample was above the clinical cut off). Youth self-report of social anxiety was negatively associated with specific social skills deficits (i.e., *assertion*) as rated on the Social Skills Rating System (SSRS; Gresham & Elliot, 1990). That is, individuals with lower ratings of assertiveness were more likely to endorse higher ratings of social anxiety; however, this relationship was only found when examining youth self-report and not parent report (Bellini, 2004).

It could be inferred from this study, and others, that anxiety in individuals with ASD may impede their ability to initiate social interactions and establish meaningful relationships with peers (Bellini, 2004; Bellini, 2006). Behavioral inhibition is a symptom commonly shared in individuals with symptoms of anxiety and individuals with ASD. The presence of this behavioral feature has been implicated as the beginning of a developmental pathway that leads to further social withdrawal and avoidance, thus contributing to further impaired social functioning and social deficits in children with ASD (Bellini, 2006). In typically developing children, researchers have proposed social withdrawal to be the developmental gateway by which social anxiety develops (Rubin &



Burgess, 2001). Similar hypotheses have been posited for children with ASD, in that deficits in social skills limit children's opportunities for social interactions and interfere with their ability to experience positive interactions (Bellini, 2006; Tantum, 2000). Thus, children with ASD are more likely to experience social rejection from peers, which makes them more likely to withdraw from social interactions altogether. Social withdrawal may then become negatively reinforcing for children with ASD as a way of avoiding social encounters that are perceived as stressors by these children. According to the literature, this response pattern may help elucidate the developmental course and emergence of anxiety and depression in this population (Bellini, 2006). However, this relationship has yet to be examined longitudinally in early childhood within a school-aged sample of children with ASD. From a preventative standpoint, it is clear that internalizing symptoms emerge prior to the onset of adolescence. The current study aims to examine these relationships early on in children's developmental trajectories in order to highlight the importance of early identification and assessment of internalizing psychopathology in young children with ASD.

Previous research on anxiety has indicated that repeated instances of social withdrawal might also hamper the development of social skills (Bellini, 2006). Children's limited opportunities to engage in social interactions and to learn socially appropriate behavior may result in an ongoing cycle of failed social interactions, thus increasing the risk of children's experience of anxiety in social situations (Rubin & Burgess, 2001). Researchers have noted that poor quality peer interactions might be the result of maladaptive strategies children with ASD adopt over time as inappropriate bids for

attention, which may in turn affect their ability to successfully participate in interactions with peers (Macintosh & Dissayanake, 2006). Additionally, researchers have observed fewer peer interactions during recess in children with ASD (Macintosh & Dissayanake, 2006). Children's frustration and awareness of their inability to "fit in," may worsen already existing behavior problems, thus interfering with children's ability to make friends and develop social competence later on in life. Avoidant behavior may be increased in the presence of co-occurring internalizing problem behaviors (Bellini, 2006), which may exacerbate social withdrawal, peer avoidance, and anxiety in children with ASD, thus increasing their difficulties with peers and positive socialization experiences.

For these reasons, it is important to study the interplay between behavioral manifestations and their effect on the social development of children with ASD. Taken together, recent outcome studies suggest that individuals with ASD may present with varying levels of impairment and heterogeneity, across time, and in different settings. For instance, higher cognitive abilities among children with ASD may contribute to higher levels of social engagement, social interest, and increased sense of competence during social interactions, resulting in more overall social awareness (Macintosh & Dissayanake, 2006; Vickerstaff et al., 2007). Studies examining variability in domains of child functioning such as social skills or behavior problems, and how these areas relate to one another, may help highlight important target outcomes for social development.

**Difficulties with Interpersonal Relationships.** Prior research has emphasized the importance of social competence and its impact on developing and maintaining meaningful interpersonal relationships (Spence, 2003). Understandably, positive

socialization experiences play an influential role in the development of social competence for all children and may carry important implications for psychological well-being and the socio-emotional adjustment of children and adolescents (Gresham, Sugai, & Horner, 2001; Ladd, 1999; Spence, 2003). Undoubtedly, children's social relationships serve an important function and have been associated with increased displays of prosocial behavior, better conflict-resolution skills, increased displays of positive affect, and social and emotional competence (Chang et al., 2016; Vaughn, Colvin, Azria et al., 2001). For instance, pro-social behaviors displayed in the early elementary years has been found to reduce internalizing behaviors in late elementary school and early middle school (Henricsson & Rydell, 2006), suggesting the important role of social relationships in warding off mental health risk in youth.

Qualitative differences in peer interactions often emerge as early as preschool (Chang et al., 2016). In one study of school-aged children (ages 4 to 10-years old), parents and teachers rated children with and without ASD on the Social Skills Rating System (SSRS; Gresham & Elliot, 1999). According to both parent and teacher reports, children with ASD were continuously found to underperform in key social skills such as cooperation (i.e., sharing and rule compliance), assertion (i.e., requesting information from others), and self-control (i.e., turn-taking behavior and developing compromises), at rates much lower than their typically developing peers on similar skills (Macintosh & Dissanayake, 2006). Unfortunately, while some children with ASD may exhibit a strong desire to engage with others socially, they often lack the skills and social awareness to do so in ways that are socially and developmentally appropriate (Bauminger & Kasari, 2000;

Chang et al., 2016; Locke, Ishjima, Kasari, & London, 2010; Mazurek & Kanne, 2010; Rotheram-Fuller, Kasari, Chamberlain, & Locke, 2010). Unfortunately, children with developmental delays are quite limited in opportunities for social interaction. Children with ASD especially struggle to reciprocate social-affective qualities during interactions, making it extremely difficult for children on the spectrum to initiate social interactions and maintain high quality relationships (Chang et al., 2016).

### **Summary and Gaps in the Existing Literature**

From a methodological standpoint, the understanding and early detection of psychopathology in individuals with ASD is less clear. Differential diagnosis in this population is often challenged by diagnostic masking and symptom overlap between various psychiatric conditions, making agreement upon methods of assessment very difficult (Mazefsky, Kao, & Oswald, 2011). In other words, there appears to be no reliable method to differentiate impairment that is primarily accounted for by core symptoms of ASD, from core symptoms due to other psychiatric conditions (Matson & Cervantes, 2014; Mazefsky et al., 2011). Although researchers have been hopeful in suggesting that symptoms of ASD can be distinguished from other disorders in spite of different presentations (Matson & Cervantes, 2014), a confounding variable in many of these studies has been the lack of psychometric validity and technical adequacy in current diagnostic practices in evaluating psychiatric comorbidity. Another major challenge has been the over-reliance on parent-report and clinical observation in the absence of child self-report, which is due to children's inconsistency in reflecting on their own subjective experience (Mazefsky et al., 2011). Best practice suggests the use of multiple sources of

information when addressing child behavior concerns for the purposes of assessment and treatment (Whitcomb & Merrell, 2013).

**Methodological Challenges in the Use of Multi-Informant Report.** Assessment of behavioral challenges and emotional difficulties in typically developing children with and without problem behaviors has demonstrated repeated informant discrepancies across multiple reporters, specifically with regards to the assessment of internalizing behavior concerns (De Los Reyes & Kazdin, 2005; Miller, Martinez, Shumka, & Baker, 2011). However, research in ASD has shown even lower rates of agreement when examining concordance among different informants (Kaat, Gadow, & Lecavalier, 2013; Kanne et al., 2009; Nicpon et al., 2010). Interestingly, reports may vary as a function of child symptom severity, specific domains being assessed, and the context in which these behaviors unfold (Azad et al., 2015; Kanne et al., 2009).

In one study examining multi-informant ratings between parent and teacher reports of psychiatric symptom severity in children with ASD, researchers found that parents tended to over-report the presence of psychiatric symptoms at a rate much higher than teachers (Kanne, Abbacchi, & Constantino, 2009). Researchers examined frequency distributions among parents and teachers by utilizing the Child Behavior Checklist (CBCL), a measure of child psychopathology (Achenbach & Rescola 2001a; 2000b). Parents were more likely to report higher rates of comorbidity, specifically with regards to mood related disorders (26%), anxiety (25%), and other behavioral concerns such as ADHD (25%), conduct problems (16%), and oppositional defiant behaviors (15%). On the other hand, teachers reported lower rates of clinically significant concerns in similar

categories, with mood related difficulties (6%), anxiety (15%), attention problems (12%), and oppositional concerns (9%; Kanne et al., 2009). Even when parent and teacher reports were collected for the typically developing sibling of the child with ASD, parents still reported higher rates of problem behaviors in their child without ASD than did teachers (Kanne et al., 2009). Further, researchers ran correlational analyses to assess the degree of correspondence between parents and teachers. Results indicated that inter-rater agreement was lower for internalizing psychiatric conditions in the children with ASD compared to externalizing behavior domains.

As previously mentioned, research on parent and teacher agreement has been inconsistent with some studies reporting high, moderate, and low agreement between raters (Kaat et al., 2013; Kanne et al., 2009). In a recent meta-analysis, informant agreement on emotional and behavioral problems, as well as social skills, was examined in youth with ASD or ID. Higher informant agreement was found between similar informant pairs (parent-parent) across ratings of internalizing, externalizing, and social skills, compared to ratings gathered from different informant pairs (Stratis & Lecavalier, 2015). Results revealed that across all informant combinations, ratings for externalizing behavior concerns demonstrated higher concordance ( $r = .42$ ), compared to internalizing behavior problems ( $r = .35$ ) and social skills ( $r = .30$ ), with agreement on externalizing problems being significantly higher than reported agreement on internalizing behavior problems and social skill deficits (Stratis & Lecavalier, 2015). Effect sizes for each cross-informant pairing and each behavior category (i.e., internalizing, externalizing, social skills) were treated separately in the analyses, with the mean weighted effect size across

all raters showing moderate agreement. It may be the case that measures of social functioning are more prone to subjectivity on behalf of parents and teachers due to the contexts in which social behaviors occur, thus affecting each rater's perception of specific features of social behaviors (Tasse & Lecavalier, 2000).

### **Current Study**

The emergence of autism research utilizing multi-informant report is promising, but there is still much to be learned about the extent to which current measures used to quantify behavior and social functioning in typically developing children can be applied in the context of ASD. The added risk of co-occurring behavior problems may exacerbate or maintain already-existing social deficits in children with ASD, an issue that has not been fully examined within the context of ASD. The present study has several objectives. The first is to examine prevalence rates and the level of agreement between parents and teachers in their reports of child psychopathology and social functioning in children with ASD in early school grades. In other words, do parents and teachers of children with ASD similarly endorse the presence or absence of a co-morbid psychiatric condition within the internalizing domain? Further, do they agree on the severity of child social impairment?

The second objective is to determine the strength of relationships among observed scores on caregiver-reported measures used to assess broad psychopathology and social functioning in children, and whether these relationships differ when compared to teacher informant ratings on similar scales. The final objective of this study is to determine whether the presence of clinically significant internalizing behavior problems is related to

the rate of change in children's social skills (as reported by parents and teachers) measured across three time points.

**Research Questions.** The purpose of the current study aims to address the following research questions: 1a) What percentage of parents and teachers endorse the presence of clinically significant internalizing behavior problems and impaired social functioning in children with ASD? 1b) To what degree do parents and teachers agree on their assessments of psychopathology and social functioning in young children with ASD? 2a) To what extent do parent and teacher reports of child internalizing behavior problems collected at T1 relate to children's social skills and self-perceived loneliness collected at a later time point? 2b) Do the strength of these relations have a greater impact than that of ASD symptomatology and externalizing behavior problems? 3a) To what extent do children's social skills change over three time points as rated by parents and teachers? 3b) To what extent do child behavior problems and autism symptomatology relate to change in children's social skills over time?

## **Method**

### **Participants**

There were 166 child participants and their parents in this study. They were drawn from a larger (N = 208) longitudinal study on the successful transition to school for young children (ages 4 to 7 years) with ASD. Participants were either referred or recruited into the study through local service agencies, schools, and state regional centers. Referral to the larger study was contingent upon a previous clinical or school diagnosis of an autism spectrum disorder and an intelligence quotient (IQ) on the Wechsler Preschool



and Primary Scales of Intelligence (WPPSI-III; Wechsler, 2002) of 55 or above. In order to verify child diagnostic status, all children were screened with the Autism Diagnostic Observation Schedule for Children (ADOS-2, Lord, Rutter, DiLavor, & Risi, 2008). Children were classified under autism or autism spectrum if they met ADOS score cut-off criteria. In cases where children had no clinical diagnosis, or only the school label of autistic-like, the Autism Diagnostic Interview-Revised (ADI-R; ADI-R; Rutter, LeCouteur, & Lord, 2008) was also administered to mothers (or primary caregivers) to further confirm the diagnosis of autism spectrum disorder.

Only those children from the larger study with a Full Scale IQ (FSIQ) score of 70 or higher will be included in the current study to yield a large sample of children with higher cognitive abilities (i.e., no comorbid intellectual disability; N=166). Children in this subsample are predominantly male (83.1%) and two-thirds were White (67.5%). A majority of parents (57.4%) reported household incomes above \$65,000. Mother education in this sample was defined by years of schooling completed. Overall, most mothers in our sample completed high school (96.4%), with more than half of mothers reporting completion of a college degree or higher (63.9%).

At the time of the first assessment (Time 1), the majority of children were enrolled in public elementary schools (59.5%) and public preschool programs (12.3%), with a small percentage (10%) enrolled in private schools or a special preschool for developmental or behavioral concerns (11%). Of the total sample, 84.3% qualified for some type of special education service. All children in this study had IQs in the typically

developing range ( $M= 93.86$ ;  $SD= 13.51$ ); mean age of participants was 5 years old ( $SD= 1.0$ ). See Table 1 for a summary of participant characteristics.

### **Eligibility Measures**

Background information was obtained from a demographic questionnaire that the parent completed at the eligibility visit. Once a child was deemed eligible for the study, measures on child behavior problems and social functioning were collected from parents and teachers during the fall (Time 1), spring (Time 2), and winter (Time 3) of the following academic year. At the Time 3 visit, children completed one measure.

**Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavor, & Risi, 2008).** The ADOS is a standardized, semi-structured play-based observation of child behavior in situations that elicit autistic tendencies. There are four modules that can be administered, dependent on the child's verbal ability. Children in this study were primarily administered Module 2 ( $n= 50$ ) and Module 3 ( $n= 104$ ), with few children receiving an administration of Module 1 ( $n= 12$ ). ADOS Modules 2 and 3 are typically reserved for children with phrase speech and fluent speech, whereas Module 1 administrations are reserved for children who do not consistently demonstrate the use of phrase speech; children who are administered this module are considered "pre-verbal." No children in this study were given a Module 4 (used with young adolescent/adult populations). Phrase speech as defined in the ADOS-2 manual includes the flexible use of non-echoed, three-word utterances, which are spontaneous in nature and provide meaningful word combinations. Overall, a majority of children in this study were considered verbally fluent.

The observation yields scores in four domains: Social Interaction, Communication, Stereotyped Behaviors and Restricted Interests, and Play. Of these domains, only two, Social Interaction and Communication, are included in the algorithm. Data from the ADOS have demonstrated reliability and validity from research on a sample of children with a diagnosis of autism (Lord et al., 2008). The ADOS has high discriminative validity with high sensitivity (97%, 95%, and 90% across Modules 1 to 3, respectively) and specificity (94%, 87%, and 94%, across Modules 1 to 3, respectively) in discriminating between children with ASD and children without a spectrum disorder. Scores from the ADOS first edition were converted to scores on that matched the ADOS-2 algorithm (second edition) to match the updated norms and algorithms of the updated version of the ADOS.

**Autism Diagnostic Interview- Revised (ADI-R; Rutter, LeCouteur, & Lord, 2008).** Children who did not have a complete diagnostic evaluation determining their autism (i.e., they had only the school assessment of “autistic-like”) were assessed further using the Autism Diagnostic Interview-Revised (ADI-R; Rutter, LeCouteur, & Lord, 2003), a 93-item parent interview. The ADI-R produces scores in three domains: Language/Communication, Reciprocal Social Interactions, and Restricted, Repetitive and Stereotyped Behaviors and Interests. In order for a child to meet diagnostic criteria, the child must meet the cut off score for each of the three domains assessed. The ADI-R has very high test-retest reliability with coefficients ranging from .93 to .97. The ADI-R has high inter-rater reliability at .86 for the total score with overall diagnostic validity being the highest for children older than 20 months.

**Wechsler Preschool and Primary Scale of Intelligence, Second Edition (WPPSI-III; Wechsler, 2002).** Children's cognitive skills were measured with the WPPSI-III, an assessment instrument with sound psychometric properties. The WPPSI-III is composed of 14 subtests and yields an IQ score with  $M=100$  and  $SD=15$ . For this study, a calculated Full Scale IQ (FSIQ) score was computed from an abbreviated measure of cognitive functioning, which included three subtests: block design, matrix reasoning and vocabulary subscales. This instrument is intended for use with children between the ages of 2:6 and 7:3 years of age. The selection of these three subtests was based on their established reliability ( $r = .95$ ) and high predictive validity in gaining an estimate of cognitive ability (Sattler & Dumont, 2004).

### **Study Measures**

**Autism Impairment.** Since social impairment is a core feature of ASD and may contribute to the development of social competence, child social impairment due to ASD will be considered as a possible covariate in this study. These social deficits were assessed via the Social Responsiveness Scale (SRS; Constantino & Gruber, 2005). The SRS is a 65-item measure that assesses the level of social impairment associated with autism. Respondents are asked to rate each item on a 4-point Likert scale (1=*Not true*, 2=*Sometimes true*, 3=*Often true*, and 4=*Almost always true*). The measure yields five different symptom domain scores (*social awareness, social cognition, social communication, social motivation, and autistic mannerisms*). Total raw scores on this measure range from 0-195, with higher scores indicating more impairment. Internal consistency, inter-rater reliability, and test-retest reliability has been shown to be

consistently strong (Constantino & Gruber, 2005). Children with standard *T*-scores that fall within 65 to 75 are considered to have symptoms in the mild to moderate range, with scores above 75 being indicative of clinically elevated symptoms. Additionally, the SRS has demonstrated criterion validity with the ADI-R, with correlations between .52 and .79. The reliability coefficients for the total score range from .93 to .97 across parent and teacher ratings.

**Internalizing Behavior Problems.** Internalizing behavior problems were examined using the Achenbach system of empirically based assessment. The Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001a, 2001b) includes both parent and teacher report forms (Teacher Rating Form, TRF) and is widely used by clinicians in the screening and assessment of psychiatric symptoms. Parents and teachers were asked to complete items describing their child's behavioral functioning on a three point Likert scale (0 = *Not true*, 1 = *Somewhat or sometimes true*, and 2 = *Very true or often true*). Depending on the child's age, participants were either administered the CBCL preschool form for ages 1.5 to 5 (99 items), or the school-age form (ages 6 to 18), which consisted of 112 items. This measure yields a standard score of 50 with a standard deviation of 10, with scores at or above 60 indicating borderline/clinical psychopathology. Higher scores on individual subscales (narrow-bands) indicate greater levels of problematic behaviors.

For the purposes of this study, only the broadband internalizing problems standard scale score was utilized to create the multi-informant predictor variables. Test-retest reliability for the broadband scale used is .90 (ages 1.5 to 5) and .94 for ages 6 to 18. The CBCL demonstrates strong evidence of discriminant, convergent, and predictive validity,

as well as construct validity with the BASC-2 (.85 to .89) for total problems (Achenbach & Rescola, 2001).

**Assessment of Social Competencies.** In order to examine variability in children's social behaviors, multi-informant and multi-method indicators were collected from parent, teacher, and child sources through the use of self-report paper and pencil measures. Most conceptualizations of social competence have attempted to incorporate certain elements that assess the appropriate use of social skills, evidence of successful social interactions, and maintenance of social relationships with peers (Vickerstaff et al., 2010). Some research considers social competence to be an evaluative form or outcome that takes into account the judgments of caregivers (given certain criteria), and demonstration of the behavior itself (social task) as compared to scores from normative samples (Gresham, Sugai, & Horner, 2001). Evaluations of social competence across situations and contexts are to be considered distinct from the assessment of discrete social skills, which are specific behaviors that need to be taught, learned, and performed (Gresham et al., 2001) In the present study, indicators of children's social competencies collected from all participants during their final (Time 3 visit) were utilized. Table 2 summarizes the study measures and at which time-point they were used.

***Social Skills (Parent and Teacher report).*** Social skills were measured through parent and teacher report on the Social Skills Improvement System (SSIS; Gresham & Elliott, 2008). The SSIS is a revised version of the widely used Social Skills Rating System (SSRS; Gresham & Elliot, 1990). The SSIS is a reliable and comprehensive measure of key social behaviors that provides an overall estimate of children's social

skills. It yields scores on various sub-domains such as *cooperation, assertion, communication, self-control, responsibility, empathy, and engagement*, as well as estimates of major scales, including social skills, problem behaviors, and academic competence (Gresham & Elliott, 2008). Parents and teachers were asked to provide their evaluation of children's social competence by rating specific behaviors exhibited by the child on a four point Likert scale (1= *Never*, 2= *Seldom*, 3= *Often*, and 4= *Almost always*). The Social Skills standard score has a mean score of 100 and a standard deviation of 15, with standard scores below 85 indicating below average social skills. The test-retest reliability coefficient for the social skills scale is .84. The internal consistency reliability is high for the social skills subscales, with coefficients ranging from .74 to .96 across age groups. The SSIS correlates .57 with another widely used measure of social skills, the Behavior Assessment System for Children (2nd ed.; BASC-2, Reynolds & Kamphaus, 2004).

***Loneliness and Social Competence (Child report)***. Another important indicator of social competence is a child's ability to get along well with others and form meaningful social relationships with peers. Children's self-perceptions of loneliness and social inadequacy were assessed through child self-report using an abbreviated version of the Loneliness and Social Dissatisfaction Questionnaire (LSDQ; Cassidy & Asher, 1992). The original measure consisted of 23 items; however for the present study, an abbreviated form was utilized, which consisted of a total of 8 items (i.e., those with the highest factor loadings in the original scale), a more appropriate length for these young children. On the LSDQ, children rated the 8 items by answering "Yes," "No," or "Sometimes" in response

to the questions such as “Are you lonely at school?” There are also 3 filler items, e.g., “Do you like to read?”

### **Procedure**

The University of California, Riverside, and the University of Massachusetts, Boston, were involved in the study; approximately two-thirds of the data collection took place in California, although the laboratory settings were nearly identical at each university. As the PI was at UCR, the Institutional Review Board approved study procedures for the project and these were accepted by the IRB at UMass-Boston. Informed consent forms were mailed home, subsequently reviewed in person with parents and collected from them at the child’s first assessment. Once deemed eligible, children were assessed at three separate time points, during the fall (Time 1) and spring (Time 2) of the current school year, and the winter (Time 3) of the following school year. This study utilized paper and pencil measures completed by the primary caregiver (in most cases mothers, 89%) and teachers from all three time-points.

During the on-site assessment, graduate student researchers trained in the study procedures met separately with the child and mother to complete a variety of tasks. Activities included an interview on topics related to the child’s behavior, relationships with his or her teacher and peers, school experiences, and overall transition to school. Assessment of child behavior problems and social development were obtained via parent- and teacher-completed questionnaires. Both parents and teachers received an honorarium.



## **Data-Analytic Plan**

**Research Question 1a.** In order to estimate prevalence rates, frequency distributions using SPSS Statistics Version 22.0 were calculated for the CBCL/TRF internalizing syndrome scales using T-scores above the borderline/clinical cut-off score. The manual indicates scores at or above 60 to be indicative of borderline/clinical psychopathology (Achenbach & Rescola, 2001). Additionally, frequency distributions were also calculated for the SSIS and SRS parent and teacher report. For the SSIS, the manual indicates standard scores at or above 100 to be within the normative range, with scores at or below 85 being indicative of social skill deficits (Gresham & Elliot, 2008). For the SRS, the manual indicates that standard scores between 60 and 75 to be characteristic of children in the mild to moderate range of autistic social impairment, whereas scores above 75 are indicative of children in the severe range (Constantino & Gruber, 2005); high scores on the SRS indicate more symptoms of autism spectrum disorder. Frequency distributions will be examined for both parent and teacher ratings on these measures, using their respective subscales and total scores, in order to determine the range of severity of symptom manifestations as perceived by different informants.

**Research Question 1b.** Concordance rates across informants were examined through SPSS Statistics software Version 22.0. Pearson-product correlation coefficients will be calculated for the CBCL/TRF internalizing broadband T-scores and parent and teacher SSIS Social Skills standard scores, in order to determine the level of agreement on quantitative measures of child psychopathology and social competence. These scores were examined only at Times 1 and 2 to yield estimates that cover the entire academic

year. These two visits occurred during the same school year, in which case reports on behavior and social skills were collected from the same teacher during that year. Parent and teacher scores on CBCL/TRF and SSIS at Time 1 and Time2 were included in these analyses to assess the level of overall concordance on these measures between parent and teacher report.

**Research Question 2.** The relation between child behavior problems and social skills were analyzed through three separate hierarchical regression analyses using SPSS Statistics software Version 22.0. Regression analysis allows researchers to predict the values on a given continuous outcome of interest (Y), based on known values from given independent predictors (X) (Cohen, Cohen, West, & Aiken, 2003). In other words, the ability for child behavior problems to predict children's social outcomes at a future point in time, will depend on three conditions: 1) whether these two variables are correlated, 2) whether behavior problems precede children's social outcomes (i.e., temporal precedence), and 3) whether this relationship still holds even when the influence of other variables (covariates) are controlled for or the effects of other variables have been eliminated (Cohen et al., 2003). Assumptions of multiple regression analysis typically consist of data being normally distributed; non-existence of multicollinearity among independent predictors; and a linear relationship between the explanatory variable and the outcome variable (Cohen et al., 2003).

Because ratings of children's social functioning are expected to vary across parent and teacher reports, both informant ratings of child social skills collected at Time 1 (Fall; beginning of school year) were utilized as control variables in the regression models.

Further, due to research summarized thus far supporting the relation between ASD symptomatology, externalizing behavior problems, and social skill outcomes, SRS Total Scores and report of child externalizing behavior problems, were entered into the models as covariates. The predictors were entered in three steps in order to examine the unique contribution of these variables to social outcomes as rated by parents, teachers, and children with ASD. Separate hierarchical regression analyses were performed for each outcome, utilizing the parent and teacher standard score on the SSIS as an outcome measure of children's social skills, as well as child report on the Loneliness measure. Variables were entered in three steps with parent or teacher report on the SSIS entered in the first block, ASD symptomatology and child externalizing behaviors entered in the second block, and parent/or teacher ratings of internalizing behavior problems entered in the final block. For the child report model, only behavior report ratings significantly correlated with the loneliness outcome variable were included in the child model as predictor variables irrespective of informant (parent/or teacher).

**Research Question 3.** The third set of research questions utilized latent growth curve models (LGMs) to examine the change in social skills throughout children's participation in the study across all three time points. These models allow researchers to examine longitudinal data and address questions related to change across repeated measurements. Further, they grant researchers the ability to model intra-individual change or within-person change across his or her individual intercept and slope estimates (Little, 2013). Through this approach, we were able to model individual trends in social skills development across the three time-points of the study. Furthermore, this approach

extends beyond the aim of the previous research question by allowing us to model change in social skills over time. This modeling approach helps address questions related to the rate of change of a single individual by characterizing the intercept and slope for each person in a given sample of individuals (Little, 2013), in this case, students with ASD and no co-morbid ID.

The present study conducted LGMs to analyze the relationships between developmental parameters (e.g., intercept and slope) among indicators of child social competence using MPlus software (Version 7; Muthen & Muthen, 2012). This modeling approach allows for an examination of growth on outcomes of interest over time and requires certain assumptions about the data (i.e., use of a continuous dependent variable, scores with same units across time, and time structured data) (Kline, 2011). The dependent variables used to answer this research question were child social skills across each measurement occasion (i.e., SSIS 1, SSIS 2, and SSIS 3) as rated by parents and teachers. These parameters indicated the mean of the scores at each time point. Growth was modeled for parent and teacher rated social skills separately.

***Model Specification.*** Model estimates were interpreted for the intercept only model, followed by the linear growth model (i.e., slope), and the latent basis model. Conceptually, LGMs involve two types of analyses. The first analysis (intercept model) takes into account the repeated measures of each individual across time (means), while the second analysis (linear model) takes into account the individual parameters (intercept and slope values) to determine the differences in growth from a baseline measure (Schumacker & Lomax, 2016). The linear model will be specified by scaling intercept

metrics to 1.0 and fixing slope estimates to reflect each time point based on the time of assessment. Since time points were not equally spaced, coefficients were selected to match the time points of measurement throughout the 18 month period—i.e., Time 1= 0, Time 2= .5, Time 3= 1.5 (see Figure 2). The latent intercept model addresses questions related to where the average person starts, whereas the slope model addressed questions related to the average rate of change.

The latent basis model is often called the unconditional model because it does not force the slope to carry a strict linear function. The intercept metric will be scaled to 1.0 and the slope will be fixed for Time 1 (0) and Time 3 (1.5), with the second time point free to vary. In essence, the latent basis model allows us to model nonlinearity by rescaling time so that only two time points of the data are fixed, while freeing the loadings of the remaining time point. After determining the best fitting model, covariates (i.e., ASD symptomatology and internalizing behavior problems) will be added to the final model. Exogenous variables within the context of LGM are referred to as covariates and help explain variation in the slope and intercept parameters. An advantage of LGM is the ability to include independent and dependent variables simultaneously, which in turn will help answer questions about which predictors affect the rate of change.

***Model Estimation.*** Multiple fit indices will be examined to assess the overall fit of the data. First, the Chi-square test statistic will be examined as a global fit index. A non-significant  $\chi^2$  statistic is indicative of model fit. However, this statistic is highly sensitive to sample size and is often significant. Alternative measures of model fit will also be examined to gauge absolute fit and comparative fit. The root mean squared error

of approximation (RMSEA) is a measure of absolute fit and provides the amount of misfit per model degrees of freedom. Values between .05 to .08 would provide a measure of close fit with values less than .08 indicating adequate fit. Further, incremental fit indices such as the comparative fit index (CFI) and Tucker-Lewis index (TLI) will also be examined. For CFI and TFI, values above .90 are considered acceptable fit values and values (Little, 2013).

***Covariate(s).*** ASD symptom impairment as rated on the parent SRS at Time 1 will be included in both PA and LGM models (research questions 2 and 3). ASD symptom severity has been well documented in the literature to account for much of the variability children's social skills and has been posited by some researchers to account for much of the discrepancies in informant ratings of social and behavioral impairment in children with ASD (Azad et al., 2015; Macintosh & Dissanayake, 2006). For these reasons, it is an important variable to consider when examining these associations as it may confound the influence of internalizing behavior problems on the outcomes of interest.

***Missing Data.*** Through MPlus software, full-information maximum likelihood (FIML) estimation method may be implemented as a data imputation method in order to use all available data (N= 166). Unlike listwise or pairwise deletion approaches, this approach to missing data imputation uses a model-based approach to estimate parameters of a model by using all available data. In other words, all present information is used to estimate the parameters and standard errors of the model in the presence of missing data (Little, 2013). This method can lead to unbiased estimates and retains statistical power by

using the larger sample size of available data rather than deleting cases where data are missing. Maximum likelihood approach to missing data will also be employed in the final question of the current study.

### **Expected Results**

Based on previous findings, it is expected that parents and teachers will likely endorse the presence of internalizing behavior problems in this sample of school-aged children with ASD, with parents being more likely to endorse clinically elevated scores compared to teacher report. Additionally, it is hypothesized that there will be a stronger association between parent and teacher ratings of children's social functioning and a poorer relationship between parent and teacher ratings of children's internalizing behavior problems. Further, it is expected that internalizing behavior problems will help explain much of the variance in children's social competencies and self-reports of loneliness, above that explained by autism symptom impairment. Finally, with regards to change in social skills, it is expected that the development of social skills will be in the expected direction (i.e., increasing over time) and will reflect a linear trajectory. The score on total internalizing behavior problems in children is expected to be a significant predictor of change or variation in social skills scores within this sample, even after controlling for autism symptom impairment. It is expected that these models will differ for parent and teacher reported variables.

## Results

### Prevalence of Child Behavior Problems

The means and standard deviations of parent and teacher reports of child behavioral and social functioning by time of assessment (Time 1 and Time 2) are presented in Tables 4 and 5. Mean total score on the parent Child Behavior Checklist (CBCL) Internalizing T-score at Time 1 was 63.56 ( $SD= 10.43$ ). Parents reported 45.1% of their children as scoring above the clinical cut-off on the *Internalizing Behavior* broadband scale, with 21.6% of children's scores falling in the borderline range. Teachers at Time 1 rated 31.1% of children as scoring above the clinical cut-off for internalizing behavior problems on the Teacher Report Form (TRF), with 13.1% falling within the borderline range. Teachers' mean total score at Time 1 on the TRF Internalizing broadband T-score was 58.30 ( $SD= 10.43$ ). At Time 2, 40% of parent ratings continued to fall above the clinical cut-off, with 14.2% falling within the borderline range ( $M= 61.41$ ,  $SD= 10.58$ ). At Time 2, 21.2% of teachers scored children above the clinical cut-off for internalizing concerns and 12.7% in the borderline range.

Overall, parents' report of child behavior problems at Time 1 resulted in elevated mean scores on two subscales (*Withdrawn/Depressed* T-score= 69; *Attention Problems* T-score= 65). Parents rated 22.9% of children as meeting borderline/clinical cut-off criteria on the *Anxious/Depressed* subscale and 56.2% on the *Withdrawn/Depressed* scale. Teacher reports of children's behavioral functioning yielded borderline mean total T-scores on the *Withdrawn/Depressed* subscale (T-score= 65) and *Attention Problems* subscale (T-score= 64). Teachers rated 18.9% of children as meeting borderline/clinical



criteria on the *Anxious/Depressed* subscale and 28.7% on the *Withdrawn/Depressed* subscale.

At the end of the school year, parents continued to rate 24.3% of children as meeting borderline/clinical cut-off criteria on the *Anxious/Depressed* subscale and 48.6% on the *Withdrawn/Depressed* scale. Teachers rated 16.1% of children as meeting borderline/clinical criteria on the *Anxious/Depressed* subscale and 18.6% on the *Withdrawn/Depressed* subscale. At the end of the year, mean total scores for syndrome scales were no longer elevated for teachers. Parents continued to report elevated concerns on the *Withdrawn/Depressed* subscale (T-score= 65) and *Attention Problems* subscale (T-score= 64).

### **Parent and Teacher Reports of Social Functioning**

Upon entry into the study, 66.3% of children displayed autistic mannerisms within the clinical range on the Social Responsiveness Scale (SRS) with T-scores above 76. In terms of overall social impairment, 65.7% were found to be in the clinical range, with 20.5% in the mild-to-moderate score range (i.e., T-scores between 60-75). On a measure of overall social functioning (SSIS), 74% of parent ratings of children's social skills were more likely to fall in the below average to well below average range compared to teacher report on the SSIS (62.2%). Mean total scores on the SSIS for both parents and teachers at Time 1 fell below average with parents reporting lower mean scores ( $M=78.68$ ,  $SD= 14.47$ ) compared to teacher mean total scores ( $M= 84.74$ ,  $SD= 14.07$ ).

At Time 1, 45.5% of parents rated their children's social skills as falling in the below average range, with 26% falling in the well below average range. Ratings for both parents and teachers were consistent across the academic year (see Table 4). Parent ratings on the SSIS across time points were highly correlated ( $r = .71, p < .01$ ), with 63.7% of children continuing to demonstrate below average social skills at Time 2. Teacher ratings on the SSIS were also highly correlated across time points, with 37.8% children scoring below average at Time 1 (see Table 4). Teachers reported 43% of children in sample as demonstrating below average social skills at Time 2.

### **Correlations Between Parent and Teacher Behavioral Reports**

Parent ratings on the CBCL at Time 1 and Time 2 were highly correlated ( $r = .72, p < .01$ ) and fairly consistent across the school year (see Table 4). Teacher ratings on the TRF at Time 1 and Time 2 were also highly correlated ( $r = .68, p < .01$ ) and showed a slight decrease in mean total score on the Internalizing broadband score ( $M = 54.96, SD = 9.93$ ). Overall, there was no significant correlation between parent and teacher reports on the CBCL Internalizing T-score and TRF Internalizing T-score at Time 1 ( $r = .12, p = .18$ ) or Time 2 ( $r = .15, p = .11$ ). See Table 5 for cross-informant agreement across the school year. Although parents and teachers did not show agreement at the syndrome level, there was a small level of agreement on the *Withdrawn/Depressed* subscale ( $r = .22, p = .02$ ) and *Somatic Complaints* subscale ( $r = .20, p = .03$ ). This association between parent and teacher reports was also present at Time 2 for the *Withdrawn/Depressed* subscale ( $r = .30, p < .01$ ) and *Somatic Complaints* subscale ( $r = .22, p = .02$ ), indicating similar reports on the observations of symptoms consistent with internalizing profiles.

Parent and teacher reports of externalizing behavior problems at Time 2 did indicate a small level of agreement between ratings ( $r = .28, p < .01$ ), with more agreement on the *Attention Problems* ( $r = .29, p < .01$ ) and *Aggression* ( $r = .26, p < .01$ ) subscales, compared to other externalizing behavior concerns. Although there was no significant agreement between parent and teacher reports of overall externalizing concerns at Time 1, parents and teachers both endorsed concerns related to attention related difficulties on the *Attention Problems* subscale ( $r = .29, p < .01$ ), demonstrating a small level of agreement. In terms of social functioning, there was no significant association between parent and teacher reports on the SSIS at Time 1 ( $r = .13, p = .17$ ). However, parent and teacher reports showed a small level of agreement at Time 2 ( $r = .22, p = .02$ ) by the end of the academic school year.

### **Relations Between Child Behavior Problems and Social Skills**

Separate hierarchical multiple regression analyses were conducted to address the second research question and examine the relations between child behavior problems and social functioning as rated by parents and teachers. Parent and teacher report of child externalizing behavior problems and ASD symptom severity (parent report) collected at Time 1 were entered into the separate models as control variables due to their associations with social outcome measures (see Table 3). Variables were entered in three steps with either parent or teacher SSIS scores at Time 1 entered in the first block, parent report of ASD symptomatology and externalizing behavior problems at Time 1 entered in the second block, and parent/or teacher ratings of internalizing behavior problems at Time 1 entered in the third block.

**Predictors of Social Skills—Parent Report.** The first hierarchical linear regression—parent report of social skills—is summarized in the left half of Table 6. In Step 1, parent report of children’s social skills on the SSIS collected at Time 1, was first entered into the model as a covariate. The variance accounted for by this variable was 30% ( $R^2 = .30$ ;  $F = 57.04$ ;  $p < .01$ ). In Step 2, child ASD symptom severity and child externalizing behavior problems were both entered into the model, only accounting for 4% of additional variance, ( $\Delta R^2 = .042$ ,  $p = .02$ ), and the model variance accounted for remained significant ( $R^2 = .34$ ;  $F = 22.73$ ;  $p < .01$ ). Child externalizing behavior problems and ASD symptomatology were not significant predictors in the model, even after controlling for parent report on the SSIS. In the third step, parent report of child internalizing behavior problems was entered into the model. The addition of child internalizing behavior problems as an independent predictor did not contribute to a significant change in model fit. The results of Step 3 indicated that this independent variable did not account for any significant change to the model ( $\Delta R^2 = .001$ ,  $p = .63$ ) and it was not a significant predictor of parent report of children’s social skills at Time 3 ( $\beta = -.05$ ,  $p = .63$ ).

**Predictors of Social Skills—Teacher Report Model.** The second hierarchical linear regression—teacher report of social skills—is summarized in the right half of Table 6. In Step 1, teacher report of children’s social skills on the SSIS at Time 1 was first entered into the model. Teachers who completed the SSIS at Time 1 were different than teachers completing the SSIS at Time 3. The variance accounted for by teacher SSIS report at Time 1 was 7% ( $R^2 = .06$ ;  $F = 5.30$ ;  $p = .02$ ) and was a significant predictor of

teacher report on the SSIS at Time 3. In Step 2, child ASD symptom severity and teacher reported externalizing problems were both entered into the model and did not account for any significant change in the model ( $\Delta R^2 = .02$ ,  $p = .45$ ) after controlling for SSIS at Time 1. The model variance accounted was no longer significant ( $R^2 = .08$ ;  $F = 2.30$ ;  $p = .08$ ). In the third and final step, the risk factor of having clinically significant internalizing behavior problems was entered into the model and was not a significant predictor of teacher report of children's social skills. The final model for teacher report of social skills, accounting for only 7% of the variance, indicated that teacher report of social skills at Time 1 was the only significant predictor related to teacher report of children's social skills the following school year ( $p < .05$ ). The remaining predictors (i.e., child behavior problems) were not significant at the  $p < .05$  level.

**Predictors of Loneliness—Child Report Model.** The third hierarchical linear regression with child-reported loneliness as the outcome variable is summarized in Table 7. Parent-and-teacher reported variables found to significantly relate to child-reported Loneliness in correlational analyses were included as predictors in the model. In the absence of a priori theory, predictors were entered in two blocks. In the first step, teacher report of children's social skills on the SSIS at Time 1 was entered into the model in the first block. The variance accounted for by teacher SSIS report at Time 1 was 2% ( $R^2 = .02$ ;  $F = 1.50$ ;  $p < .22$ ). In Step 2, teacher reported internalizing behavior problems was entered into the model, accounting for 4% of additional variance, ( $\Delta R^2 = .04$ ,  $p = .05$ ), and the model variance accounted for was significant at the trend level ( $R^2 = .06$ ;  $F = 2.79$ ;  $p = .07$ ). The addition of teacher-reported child internalizing problems contributed a

significant change in model fit ( $p < .05$ ). This final model accounting for 6% of the variance indicated that teacher report of child internalizing behavior problems was a significant predictor of children's report of loneliness.

### **Longitudinal Predictors of Social Skill Growth**

The third research question sought to examine the change in children's social skills over time, and the extent to which internalizing behavior problems and autism symptomatology predicted growth in children's social skills. This question was analyzed through conditional latent growth curve analysis using structural equation modeling. A general examination of means in social skills from Time 1 to Time 3 indicated an upward trend in the development of children's social skills (see Table 8 and Table 11).

This model was examined in multiple steps separately for both parent and teacher rated perceptions of children's social skills (Kline, 2011). The first model (intercept model), assumed that there was no change in the repeated measures for social skills. Second, change models were run separately on just the repeated measures variables to explain the covariances and means of these variables across time. Lastly, the predictors (children's internalizing behaviors and autism symptomatology) were added to the best fitting model to predict change, and the outcome (social skills). Measures of fit were considered at each step, and are presented in (Tables 9 and 12). Missing data were addressed through full information maximum likelihood (FIML) method. Model fit statistics for the series of models fitted to the social skills variables are provided in Table 9 and Table 12. The building of the growth models for parents and teachers are discussed separately.

**Parent Model.** The first model was an intercept-only model, which is the most restrictive model, and assumes that there was no growth or change over time in social skills. The “no growth” model for social skills showed poor fit to the data, as indicated by a significant chi-square,  $\chi^2(4) = 29.64, p < .001$  and a high RMSEA estimate of .22. Furthermore, the CFI (.83) and TFI (.87) model fit indices indicated limited fit to the data with values both below .90, thus the model building proceeded to the next step.

Next, a linear growth model was fit to the data to examine if model fit could be improved. This second model examined change across time in social skills by scaling slope paths so that growth reflected a linear trajectory. Slope estimates were fixed according to the time children were assessed in order to represent that one unit of time that had passed in between each repeated measurement of social skills. The slope for Time 1 was set to 0, Time 2 was set to .5, and Time 3 was set to 1.25, which represented the course of participation of children in the study (18 months). This model yielded adequate fit across model fit indices. The model produced a non-significant chi-square,  $\chi^2(1) = .02, p = .90$  and a RMSEA estimate of 0 (CI = .00-.10). Further, the CFI and TLI estimates both suggested adequate fit to the data with values of 1.00 and 1.02, respectively. Additionally, the intercept was negatively correlated with the slope  $r = -.52$  with a covariance estimate of -106.59, indicating that lower initial status in social skills (intercept) led to a greater increase in social skills over time (slope). The estimated variances of both the intercept and slope factor were statistically significant ( $p < .01$ ), suggesting that children in this sample were not homogenous in either their initial levels of social skills or the slopes of subsequent linear increases in social skills.

Results suggested a linear model fit best to the data (see Table 9).

In the final model, predictors (internalizing behavior problems and autism symptomatology were added to the linear model) as the final step to assess the extent to which these variables accounted for variability in children's social skills over time. The final model produced good fit to the data. Results indicated that internalizing behavior problems ( $B = -7.91$ ,  $\beta = -.46$ ,  $p = .01$ ) and autism symptomatology ( $B = -16.04$ ,  $\beta = -.93$ ,  $p < .01$ ) were significant predictor of initial status of social skills for children, but were not significantly related to the rate of change in children's social skills. In other words, when we adjust for measurement error and control for autism symptomatology, children with higher scores on the internalizing behavior problems variable had lower initial levels of social skills. When we adjust for measurement error and control for children's internalizing behavior, children with higher autism symptomatology had lower initial levels of social skills.

Both the internalizing behavior variable and autism symptomatology variable were coded as dichotomous variables with 0 = non-clinical behavior problems/autism symptoms and 1 = clinically significant behavior problems/autism symptoms. Results suggest that children, who demonstrated clinically significant internalizing behavior problems, have lower initial levels of social skills by 7.92 compared with children who have average levels of internalizing behavior problems. Further, children who demonstrated clinically significant autism symptoms, have lower levels of social skills by 16.02 units compared to children who have an average presentation of autism symptoms.

**Teacher Model.** Teacher ratings of children's social skills were also collected for



comparison. Growth models were also examined using teacher report collected across three time points. Similarly, the first model was an intercept-only model, which assumes no growth or change over time in social skills. The “no growth” model for social skills showed poor fit to the data (see Table 12), as indicated by a significant chi-square,  $\chi^2(4) = 24.57$ ,  $p < .001$  and a high RMSEA estimate of .19. Furthermore, the CFI (.65) and TFI (.74) model fit indices indicated limited fit to the data with values both below .90, thus the model building proceeded to the next step.

The next model examined change across time in social skills. A linear growth model was fit to the data to examine if model fit could be improved. Slope estimates were fixed according to the time children were assessed in order to model a linear trajectory and reflect the time point children were assessed. The slope for Time 1 was set to 0, Time 2 was set to .5, and Time 3 was set to 1.25. This model yielded adequate fit across model fit indices (see Table 12). The model produced a non-significant chi-square,  $\chi^2(1) = 1.35$ ,  $p = .24$  and a RMSEA estimate of .05 (CI = .00-.23). Further, the CFI and TLI estimates both suggested adequate fit to the data with values of .99 and .98, respectively. Additionally, the intercept was negatively correlated with the slope  $r = -.82$  with a covariance estimate of -289.71, indicating that lower initial status in social skills (intercept) led to a greater increase in social skills over time (slope). The estimated variances of both the intercept and slope factor were statistically significant ( $p < .01$ ), suggesting that children in this sample were not homogenous in either their initial levels of social skills or the slopes of subsequent linear increases in social skills. Results suggested a linear model fit best to the data.

In the final model, predictors (internalizing behavior problems and autism symptomatology) were added to the linear model as the final step to assess the extent to which predictor variables accounted for variability in children's social skills over time. Both the internalizing behavior variable and autism symptomatology variable were coded as dichotomous variables with 0= non-clinical behavior problems/autism symptoms and 1= clinically significant behavior problems/autism symptoms. The final model produced good fit to the data (see Table 13). Results indicated that internalizing behavior problems ( $B= 9.73, \beta = .22, p = .03$ ) and autism symptomatology ( $B= -10.07, \beta = -10.07, p = .03$ ) were significantly related to the initial status of social skills for children, but were not significantly related to the slope or the rate of changes in children's social skills. Based on the coding system of 0 for non-clinical behavior problems and 1 for children meeting clinical cut-off criteria, these findings suggest that children who met clinical criteria for internalizing behaviors and ASD symptom severity had lower scores on social skills at initial status compared to children with average scores. However, their rate of change in social skills was negligible.

## **Discussion**

### **Parent and Teacher Agreement on Social-Behavioral Functioning**

The purpose of the present study was to examine the associations between child internalizing behavior problems and social outcomes in children with ASD. Child levels of social and behavioral functioning were assessed through parent and teacher reports on parallel forms used to measure these constructs in school-aged children. Parent and teacher data were collected on separate measurement occasions at the beginning and end

of the school year. The first aim of the study was to examine the prevalence of parent and teacher reported internalizing concerns in children with ASD. Consistent with previous findings (Simonoff et al., 2008), a large proportion of children in this study were found to exhibit internalizing symptoms, with parents reporting higher percentages compared to teachers throughout the school year. Prevalence estimates suggested that parents and teachers both endorsed the presence of internalizing symptoms and social deficits in children. Parents and teachers similarly reported children as having below average social skills; however parents were more likely to report lower mean scores compared to teachers at the beginning and end of the school year.

While parents and teachers observed these behaviors and social deficits in children, examination of parent and teacher agreement on these measures across two time points revealed consistent discrepancies in their reports throughout the school year. Furthermore, these cross-informant ratings on global measures of internalizing psychopathology (CBCL/TRF) did not reflect significant agreement between parents and teachers. Other studies have noticed similar informant patterns, with parents and teachers showing greater agreement in the assessment of externalizing behavior problems and lower levels of informant agreement regarding the presence of internalizing behavior problems (Stratis & Lecavalier, 2015). Nonetheless, parents and teachers did demonstrate a small level of agreement on specific behaviors such as the presence of withdrawn behavior and attentional difficulties. This finding suggests that certain behavioral symptoms, such as inattention and withdrawal, are not necessarily context-specific and may manifest similarly across settings. Thus, observers may be more sensitive to the

saliency of these behaviors and perceive these behaviors as having a greater impact on child functioning.

Parent and teacher reports of social skills also showed a small level of agreement at the end of the school year, which is consistent with previous findings (Azad et al., 2015; Kanne et al., 2009; Macintosh & Dissanayake, 2006). Such agreement may be a function of the construct being measured and the outcome to which it was linked (Laird, & De Los Reyes, 2013), or even informant behavioral expectations and thresholds (De Los Reyes & Kazdin, 2005). It may be the case that by the end of the school year, teachers had more opportunities to observe social behaviors in children across various social situations, which contributed to similar ratings across informant pairs.

### **Predictor-Outcome Associations**

Social and behavioral concerns may manifest differently across different settings (e.g., school versus home); thus, measures utilized to tap into these behavioral domains may be more prone to discrepancies among informants. Additionally, the added risk of co-occurring behavior problems may exacerbate or maintain already existing social deficits in children with ASD, making certain raters (i.e., parents) more observant of these behaviors. Further, researchers have convincingly demonstrated that psychiatric comorbidity in ASD is undeniable and may be more burdensome than ASD symptomatology alone (Joshi, Petty, Wozniak, et al., 2010).

In order to examine these relationships, one additional aim of this study was to utilize both parent and teacher reports of child behavior problems, and examine these reports as separate predictors of children's social outcomes. Separate models were

examined for parent, teacher, and child report of social outcomes. When looking at parent and teacher report models separately, the only significant predictor of children's social skills the following school year, were informant ratings of social skills at Time 1. Parent and teacher perceptions of social skills at the start of the school year were more likely to predict social skills the following school year, even when adding child behavior problems as predictors into the models. When controlling for ASD symptom severity and externalizing behaviors, the presence of child internalizing behavior problems did not contribute any additional or unique variance to the models. Results suggest that parent and teacher ratings of social skills are fairly stable and may be better indicators of children's social skills over time.

Interestingly, teacher report of internalizing behavior problems was significantly related to children's report of loneliness and was found to be a significant predictor in the child report model. This is consistent with previous findings from Zeedyk and colleagues (2015) where teacher reports of child behavior problems on the TRF were found to significantly predict child-reported loneliness on the LSR. While the Zeedyk et al. examined teacher report of total problems, the present study examined teacher report of internalizing behavior problems. Associations between teacher report and child report lend support to research highlighting the situational-specificity of social behaviors (Renk & Phares, 2004) and the use of more than one informant. This finding suggests that these relations may be context-specific given the social experiences children are exposed to at school compared to their home environment. Notable, social encounters at school may

place children at risk for experiencing social isolation and rejection from classroom peers.

### **Longitudinal Models**

The final aim of this study was to examine the longitudinal trajectory of social skills in children with ASD and to determine if this growth was related to clinical presentations of child internalizing behavior problems and ASD symptom severity. Parent and teacher ratings of children's social skills were utilized as outcomes in the growth models. Parent and teacher models were built separately, including predictors (child behavior problems) in the final models. For both parents and teachers, a linear model fit best to the data, suggesting that the development of children's social skills follows a linear trajectory. This finding is consistent with previous work examining the trajectories of social outcomes in this population. For parents and teachers, the association between initial levels of behavioral problems and growth in social skills indicated a negative relationship, such that higher levels of internalizing behaviors and ASD symptomatology were associated with lower levels of social skills. There was also significant variability across individuals at baseline; however, slopes did not significantly vary, suggesting that all children changed over time at similar rates. There was a significant negative correlation between baseline scores and slopes in both parent and teacher models, however, indicating that those children with higher internalizing symptoms and behavior problems were more likely to experience decline in social skills scores over time.

Constantino and colleagues (2009) examined the longitudinal trajectories of social impairments in a wide age-range of children with and without ASD by examining the stability of symptoms over time between sibling pairs (ages 3-to-18) exhibiting clinical and non-clinical thresholds of social impairment on the Social Responsiveness Scale (SRS; Constantino & Gruber, 2005). Findings from this longitudinal study were consistent with previous studies examining the stability of inter-individual differences in autistic social impairments over time. In other words, individuals with ASD remained clearly distinguishable from “non-affected” individuals over the years with regards to severity of their social impairments. Interestingly, some subtle improvements in SRS scores over time were noted for individuals with ASD, with individual trajectories showing variation as a function of symptom severity at baseline (Constantino et al., 2009). Children with higher severity scores (i.e., more severely affected youth) showed the greatest reduction in social impairment scores over time. Throughout the course of Constantino et al.’s study, improvements were evident in even in the most socially competent of children, suggesting that social development appears to follow a linear trajectory in children with ASD (Constantino et al., 2009).

Constantino and colleagues monitored the growth of children’s social responsiveness over the course of five years. The present study focused on a more limited window in early childhood (across 18-months), which may not be sufficient in studying the course of social development. Although internalizing behavior problems and ASD symptomatology were not significantly related to the rate of change in children’s social skills over time, they were significant predictors of children’s initial status of social

skills according to both parent and teacher report. Clinically significant internalizing behaviors and ASD symptomatology may worsen already existing social deficits in children with ASD, which carries important implications for early intervention and school-based consultation efforts aimed at improving the social-emotional functioning of children with ASD in public school settings.

### **Limitations**

While this study utilized multi-informant reports of children's social and behavioral functioning, it was not without limitations. For example, these data may not accurately reflect prevalence estimates for internalizing behaviors for broader age ranges of school-aged children with ASD. Another limitation of the study was the amount of time in-between measurement occasions. While measures utilized in this study are known to be valid and reliable indicators of child behavior (e.g., CBCL/TRF), measures used to assess social functioning in this sample may be less sensitive to change and maturation effects. Further, previous studies have targeted a wider range of child ages and have studied social behaviors either at a single time point or longitudinally using very specific measures of child social responsiveness or adaptive behaviors (Constantino et al., 2009; Szatmari et al., 2009). The present study included a sample of young children with ASD in a narrow age range (ages 4 to 7) over the course of an 18-month period, which presented a limited window in children's development. This may not have been a sufficient amount of time to capture changes in children's social skills or predictor-outcome associations over time.



Further, this study utilized global measures of child psychopathology and social competence. These measures, though reliable indicators of children's social and behavioral functioning, may only capture context-bound abilities that may vary as a function of the settings in which these behaviors occur and the information available to informants. It may be the case that psychopathology is more pronounced when informants agree on the presence of specific symptoms, rather than broad social abilities that are situation-specific (e.g., home versus school environment). A more comprehensive assessment of children's social skills would have also included data on the receipt of prior social skills intervention. Future studies should consider this as an important variable to consider when examining child social outcomes.

### **Implications and Future Directions**

Children with ASD are among the largest growing disability groups now being represented and served under IDEA. Compared to undiagnosed children, students with a diagnosis of ASD are four times more likely to receive school-based services (Bitterman, Daley, Misra, Carlson, & Markowitz, 2008). School-based service provision for students with ASD is increasingly on the rise, with services ranging from educational related support to mental health and community-based services (Bitterman et al., 2008). Considering the percentage of children in this sample that met clinically significant concerns for internalizing behaviors, parents and teachers are likely to observe the emergence of psychopathology early on in children's schooling experiences. Similarly, children's social functioning and severity of ASD symptoms may also vary upon school entry and require individualized intervention and treatment plans. Children's baseline

level of functioning may present diagnostic challenges for service providers in terms of designating the most appropriate services and educational benchmarks for children as they transition from community-based services to public school services.

Unfortunately, the provision of evidence-based social skills interventions is limited in schools, with even fewer services focused on mental health (Bellini, Peters, Benner, & Hopf, 2007; Bitterman et al., 2008). Although internalizing behavior problems and symptom severity did not impact the rate of change in children's social skill growth for children in this study, findings did suggest variability in children's initial levels of social skills as a result of behavior problems. Results from this study may lend support for the importance of early social-emotional screening for children with ASD as part of the initial intake or school-based evaluation process for determining appropriate intervention services. Social skills interventions are typically provided to children with disruptive behavioral challenges and children that fit more of an externalizing behavior profile. On the other hand, internalizing symptom profiles may go undetected and underreported by teachers and educational staff since these behaviors are often perceived as less disruptive to the educational environment and less likely to interfere with academic activities.

While quality and access to social-emotional support services may vary across states and school districts, social skills interventions in schools are not always evidence-based and implemented with high treatment integrity (Bellini et al., 2007). Further, most social skill curricula target context-bound abilities (e.g., cooperation, problem-solving) rather than abilities that are more intrinsic to the child (e.g., self-regulation, cognitive

flexibility, and distress tolerance), which have a greater influence on psychological well-being. Presently there are social skills interventions aimed at improving social and interpersonal skills such as social-communication, social thinking, assertion, and conflict resolution among young children and adolescent populations (Bellini et al., 2007). However, children with ASD often require a multimodal approach to intervention and treatment, in addition to interdisciplinary collaboration between professionals. For this population of students, a challenge for many practitioners is determining the best intervention approach given children's individual profiles with respect to learning styles, social-cognitive deficits, language ability, difficulty regulating stress, and co-occurring behavior difficulties. School consultation is essential in order to educate parents and teachers on best practices and how to modify support services in schools that are tailored to children's individual needs.

The present study found associations between teacher report of internalizing behavior problems and children's report of loneliness. Perhaps interventions targeting children's internalizing behavior problems in intervention settings where children are likely to experience social isolation (e.g., school) would be more practical in terms of improving children's socialization experiences. Although there is limited support for evidence-based treatment programs for the reduction of anxiety in children with ASD, current research on the adaptation of cognitive-behavior treatment (CBT) for use with individuals with ASD has led to promising results (White, Keonig, & Scahill, 2007; Wood, Drahota, Sze, et al., 2009). Modifying CBT programs further by including explicit social skills instruction and practice through modeling and role-playing may help

enhance treatment outcomes for youth on the spectrum. The teaching of specific strategies to use in social encounters, in addition to coping mechanisms to reduce arousal in social situations, may lead to more positive experiences for youth and positive social outcomes.

The growing prevalence of ASD necessitates the need for psychosocial treatment programs that recognize not only the social deficits of children with ASD, but also acknowledge the increased risk of psychopathology in this population. Programs often focus on these concerns in isolation and neglect many of the associated problems that go beyond core diagnostic features of ASD. More research that examines the effectiveness of multimodal treatments for youth with ASD is needed. Further, future research should focus on identifying assessment tools that will not only identify children at risk for psychopathology, but will also be sensitive to monitoring change and treatment outcomes. Understanding the emergence and development of psychopathology in this population and identifying how these pathways contribute to children's social trajectories will be an important focus of treatment and future research in this area.

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Table 1

*Participant Characteristics (N=166)*

<i>Variable</i>	<i>M (SD)</i>
<b>Child</b>	
Age	5.1 (1.00)
WPPSI FSIQ	93.86 (13.51)
Gender (%Male)	83.1
Race (% Caucasian)	67.5
<b>Mother</b>	
Income (%> 65, 000)	57.4
Mother's Education (%College)	63.9

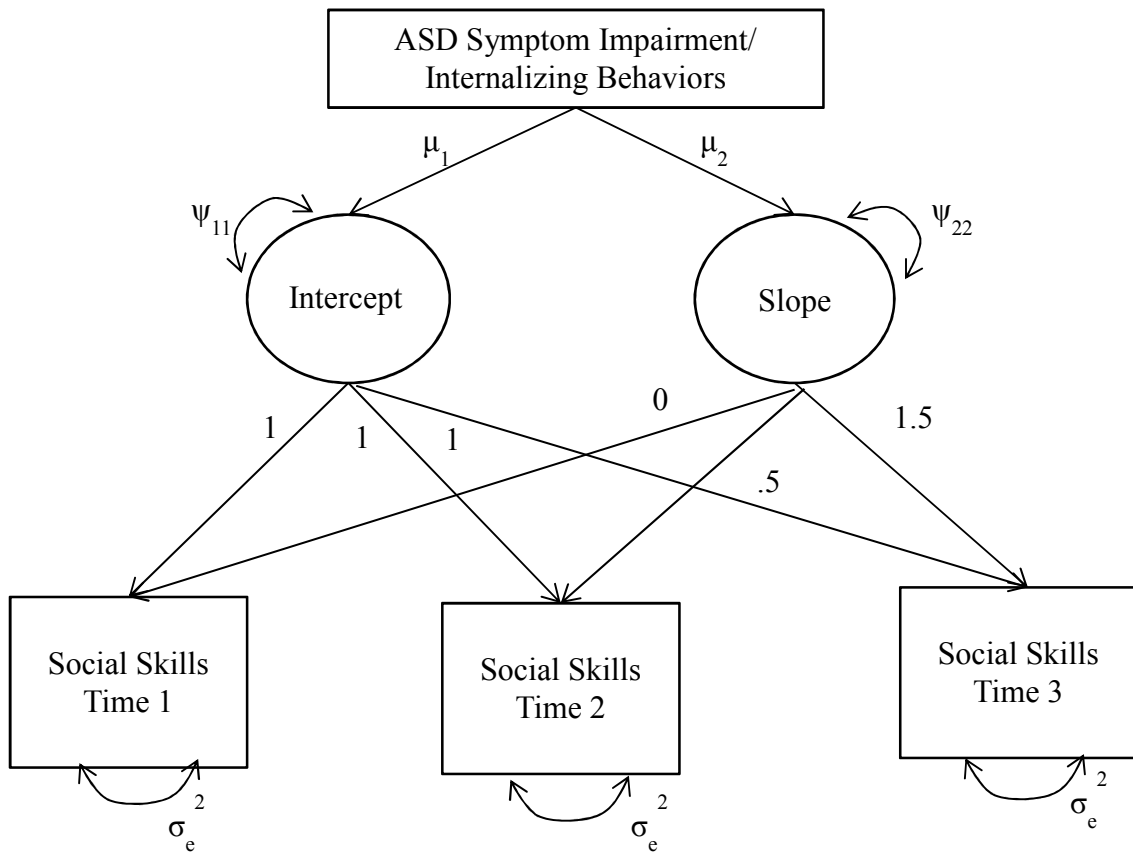
Table 2

*Outline of Research Questions and Proposed Study Measures*

Research Question	Measures	Data Used	Informants
RQ1—Frequency Distribution/Correlational Analysis	Social Skills Rating System (SSIS) Child Behavior Checklist (CBCL)/Teacher Rating Form (TRF)	Time 1, Time 2	Parent, Teacher
RQ2—Regression Analyses	<u>Covariates/Predictors</u> ASD Symptoms (SRS) CBCL Externalizing CBCL/TRF Internalizing  <u>Outcome Measures</u> SSIS LSDQ	Time 1     Time 3	Parent, Teacher     Parent, Teacher, Child
RQ3—Latent Growth Curve Models	<u>Covariates/Predictors</u> ASD Symptoms (SRS) CBCL/TRF  <u>Dependent Variables</u> SSIS	Time 1    Time 1, Time 2, Time 3	Parent, Teacher    Parent, Teacher

*Note.* Time 1= Fall; Time 2= Spring; Time 3= Winter. Measures collected at Time 1 and Time 2 occurred during the same academic school year. The third and final visit occurred the following school year. LSDQ= Loneliness and Social Dissatisfaction Questionnaire, the only measure of child self-report collected in this study. All other measures were parent and teacher report. SRS= Social Responsiveness Scale; total t-score entered as covariate to control for autism related social impairment; SRS was collected via parent report only at Time 1.





*Figure 1.* Latent growth curve model for child social skills being tested across three periods of assessment. This model will be similarly constructed for both parents and teachers.

Table 3

*Correlations among variables*

Variable	1	2	3	4	5	6	7	8	9	10
1. SRS Total	1									
2. CBCL Int Bx	.62**	1								
3. TRF Int Bx	.17	.12	1							
4. CBCL Ext Bx	.57**	.63**	.02	1						
5. TRF Ext Bx	.06	.03	.65**	.17	1					
6. SSIS P1	-.58	-.40**	-.17	-.44**	-.06	1				
7. SSIS T1	-.08	.10	-.55**	.02	-.57**	.65**	1			
8. LSR	.04	.07	.26**	.09	.13	-.17	-.12*	1		
9. SSIS P3	-.47**	-.35**	-.09	-.39**	.05	.56**	.10	.20*	1	
10. SSIS T3	-.14	.00	-.19	-.09	-.22*	.16	.24*	.13	.08	1

*Note.* SRS Total= Social Responsiveness T-Score; CBCL Int Bx= Parent Report of Internalizing Behavior Problems T-Score; TRF Int Bx= Teacher Report of Child Behavior Problems T-Score; CBCL Ext Bx= Parent Report of Child Externalizing Problems T-Score; TRF=Teacher Report of Externalizing Problems T-Score, SSIS P1= Social Skills Standard Score (Parent Report) at Time 1; SSIS T1= Social Skills Standard Score (Teacher Report) at Time 1; LSR= Loneliness (Child Report); SSIS P3= Social Skills Standard Score (Parent Report) Time 3; SSIS T3= Social Skills Standard Score (Teacher Report) at Time 3.

\* $p < .05$ .

\*\* $p < .01$ .

Table 4

*Social and Behavior Mean Scores at Times 1 and 2 (Parent and Teacher Report)*

Variable	Mean (SD)	Mean (SD)	% Meeting Clinical Cut-Off		<i>r</i>
			Time 1	Time 2	
Parent					
CBCL Int Bx	63.56 (10.43)	61.41 (10.58)	45.1	40	.72**
CBCL Ext Bx	60.39 (11.09)	59.22 (11.14)	34.3	27.7	.84**
SSIS	78.68 (14.47)	79.13 (15.96)	71.5	63.7	.71**
Teacher					
TRF Int Bx	58.30 (10.43)	54.96 (9.93)	31.1	21.2	.68**
TRF Ext Bx	57.58 (9.61)	55.74 (9.56)	18.7	13.9	.73**
SSIS	84.74 (14.07)	88.11 (13.64)	37.8	43	.73**

*Note.* Correlations reported for same informant from Time 1 to Time 2.

\**p* < .05.

\*\**p* < .01.

Table 5

*Mean Values and Correlations—Parent and Teacher Report on CBCL/TRF and SSIS*

Beginning of Year (Time 1)			End of Year (Time 2)		
Parent <i>M (SD)</i>	Teacher <i>M (SD)</i>	<i>r</i>	Parent <i>M (SD)</i>	Teacher <i>M (SD)</i>	<i>r</i>
<i>Internalizing Bx</i>					
63.56 (10.43)	58.30 (10.43)	.12	61.41 (10.58)	54.96 (9.93)	.15
<i>Externalizing Bx</i>					
60.39 (11.09)	57.58 (9.61)	.17	59.22 (11.14)	55.74 (9.56)	.28**
<i>Social Skills</i>					
78.68 (14.47)	84.74 (14.07)	.13	79.13 (15.96)	88.11 (13.64)	.22*

\*  $p < .05$ ; \*\* $p < .01$

Table 6

*Hierarchical Linear Regressions Predicting Child Social Skills—Parent and Teacher Report*

Block	Parent	<i>B</i>	SE <i>B</i>	$\beta$	<i>R</i> <sup>2</sup>	Teacher	<i>B</i>	SE <i>B</i>	$\beta$	<i>R</i> <sup>2</sup>
1	SSIS P1	.56	.07	.55**	.30	SSIS T1	.25	.11	.25*	.06
2	SSIS P1	.41	.09	.40	.34	SSIS T1	.17	.13	.17	.08
	ASD Sym	-.22	.12	-.17		ASD Sym	-.06	.13	-.05	
	CBCL Ext	-.14	.12	-.11		TRF Ext	-.22	.19	-.15	
3	SSIS P1	.41	.09	.40	.35	SSIS T1	.16	.13	.16	.08
	ASD Sym	-.19	.13	-.16		ASD Sym	-.06	.13	-.05	
	CBCL Ext	-.12	.13	-.09		TRF Ext	-.21	.22	-.14	
	CBCL Int	-.06	.13	-.05		TRF Int	-.03	.21	-.02	

*Note.* SSIS P1= Social Skills Standard Score (Parent Report at Time 1); ASD Sym= SRS Total Symptom Score at Time 1 (Parent Report); CBCL Ext= Parent Report of Externalizing Behavior Problems at Time 1; CBCL Int= Parent Report of Internalizing Behavior Problems at Time 1. TRF Ext= Teacher Report of Externalizing Behavior Problems at Time 1; TRF Int= Teacher Report of Internalizing Behavior Problems at Time 1. \**p*< .05; \*\**p*< .01.

Table 7

*Hierarchical Regression Analysis—Child Report of Loneliness (LSR)*

Block	Predictors	<i>B</i>	SE <i>B</i>	$\beta$	<i>R</i> <sup>2</sup>
1	SSIS T1	-.00	.01	-.12	.02
2	SSIS T1	.00	.01	.00	.06
	TRF Int	.02	.01	.24*	

*Note.* SSIS T1= Social Skills Time 1 (Teacher Report). TRF Int= Internalizing Broadband T-Score—Teacher Report at Time 1. \**p*< .05; \*\**p*< .01.

Table 8

*Descriptives of Input Measures (Correlations, Standard Deviations, Means for SSIS)—  
Parent LGM*

Variable	1	2	3	4	5
<u>Social Skills</u>					
Time 1	1.00				
Time 2	.73	1.00			
Time 3	.50	.54	1.00		
<u>Predictors</u>					
CBCL Int. Bx	-.38	-.38	-.24	1.00	
ASD Sym.	-.49	-.45	-.38	.43	1.00
M	64.58	67.34	72.34		
SD	18.26	19.34	19.19		

Table 9

*Model Results for Social Skills—Parent Model*

	Intercept Only	Linear
$\chi^2$ (df)	29.64(4)	.02(1)
<i>p</i> value	.00	.90
$\Delta \chi^2$	-	29.62
$\Delta$ df	-	3
CFI	.83	1.00
TLI	.87	1.02
BIC	3691.67	3677.24
RMSEA	.20 (.14 -.27)	.00 (.00 -.10)

*Note.* RMSEA= Root Mean Square Error of Approximation (i.e., test of absolute fit); values less than .08 indicate adequate fit. CFI= Comparative Fit Index (i.e., incremental fit index); TLI= Tucker-Lewis Index; Chi-Square and degrees of freedom also included.



Table 10

*Final Model Parameter Estimates for Parent SSIS—Prediction Model*

Model Results		Estimate	S. E.	Est./S.E.	<i>p</i> Value
Unstandardized Parameters					
Intercept by	SSIS 1	1.00	.00	-	-
	SSIS 2	1.00	.00	-	-
	SSIS 3	1.00	.00	-	-
Slope by	SSIS 1	.00	.00	-	-
	SSIS 2	.50	.00	-	-
	SSIS 3	1.25	.00	-	-
Intercept on CBCL Int Bx		-7.92	2.82	-2.81	.01
Intercept on SRS Total		-16.04	3.06	-5.23	.00
Slope on Int Bx		2.89	2.77	1.04	.30
Slope on SRS Total		1.31	2.98	.44	.66
Intercept w/ Slope		-80.33	34.96	-2.30	.02
Standardized Parameters (STDYX Standardization)					
Intercept by	SSIS 1	.94	.05	20.42	.00
	SSIS 2	.91	.05	20.23	.00
	SSIS 3	.90	.08	10.80	.00
Slope by	SSIS 1	.00	.00	-	-
	SSIS 2	.27	.06	4.42	.00
	SSIS 3	.67	.17	3.94	.00
Intercept on CBCL Int Bx		-.23	.08	-2.81	.01
Intercept on SRS Total		-.42	.08	-5.53	.00
Slope on Int Bx		.14	.14	1.02	.31
Slope on SRS Total		.06	.13	.44	.66
Intercept w/ Slope		-.55	.13	-4.29	.00

*Note.* S.E. = standard error, Est. = estimate, SSIS = Social Skills Improvement System, CBCL Int Bx = Child Behavior Checklist Internalizing Behaviors (1= Clinical vs. 0= Non-Clinical), SRS= Social Responsiveness Scale (1= Clinical vs. 0= Non-Clinical).

Table 11

*Descriptives of Input Measures (Correlations, Standard Deviations, Means for SSIS)—  
Teacher LGM*

Variable	1	2	3	4	5
<u>Social Skills</u>					
Time 1	1.00				
Time 2	.66	1.00			
Time 3	.24	.27	1.00		
<u>Predictors</u>					
CBCL Int. Bx	.12	.11	.06	1.00	
ASD Sym.	-.12	-.11	.01	.43	1.00
M	69.14	73.38	74.85		
SD	21.14	22.70	20.69		

Table 12

*Model Results for Social Skills—Teacher Model*

	Intercept Only	Linear
$\chi^2$ (df)	24.57 (4)	1.35 (1)
<i>p</i> value	.00	.24
$\Delta \chi^2$	-	23.22
$\Delta$ df	-	3
CFI	.66	.99
TLI	.74	.98
BIC	3030.80	3022.53
RMSEA	.19 (.12-.26)	.05 (.00-.23)

*Note.* RMSEA= Root Mean Square Error of Approximation (i.e., test of absolute fit); values less than .08 indicate adequate fit. CFI= Comparative Fit Index (i.e., incremental fit index); TLI= Tucker-Lewis Index; Chi-Square and degrees of freedom also included.

Table 13

*Final Model Parameter Estimates for Teacher SSIS—Prediction Model*

Model Results		Estimate	S. E.	Est./S.E.	<i>p</i> Value
<b>Unstandardized Parameters</b>					
Intercept by	SSIS 1	1.00	.00	-	-
	SSIS 2	1.00	.00	-	-
	SSIS 3	1.00	.00	-	-
Slope by	SSIS 1	.00	.00	-	-
	SSIS 2	.50	.00	-	-
	SSIS 3	1.25	.00	-	-
Intercept on CBCL Int Bx		9.37	4.34	2.16	.03
Intercept on SRS Total		-10.07	4.73	-2.13	.03
Slope on Int Bx		-4.68	4.39	-1.07	.29
Slope on SRS Total		6.67	4.72	1.41	.16
Intercept w/ Slope		-258.63	81.09	-3.19	.00
<b>Standardized Parameters (STDYX Standardization)</b>					
Intercept by	SSIS 1	.98	.07	14.18	.00
	SSIS 2	.94	.07	13.95	.00
	SSIS 3	1.02	.12	8.29	.00
Slope by	SSIS 1	.00	.00	-	-
	SSIS 2	.35	.07	4.98	.00
	SSIS 3	.95	.22	4.32	.00
Intercept on CBCL Int Bx		.22	.10	2.16	.03
Intercept on SRS Total		-.22	.10	-2.12	.03
Slope on Int Bx		-.15	.14	-1.04	.30
Slope on SRS Total		.20	.14	1.37	.17
Intercept w/ Slope		-.80	.11	-7.42	.00

*Note.* S.E. = standard error, Est. = estimate, SSIS = Social Skills Improvement System, CBCL Int Bx = Child Behavior Checklist Internalizing Behaviors (1= Clinical vs. 0= Non-Clinical), SRS= Social Responsiveness Scale (1= Clinical vs. 0= Non-Clinical).

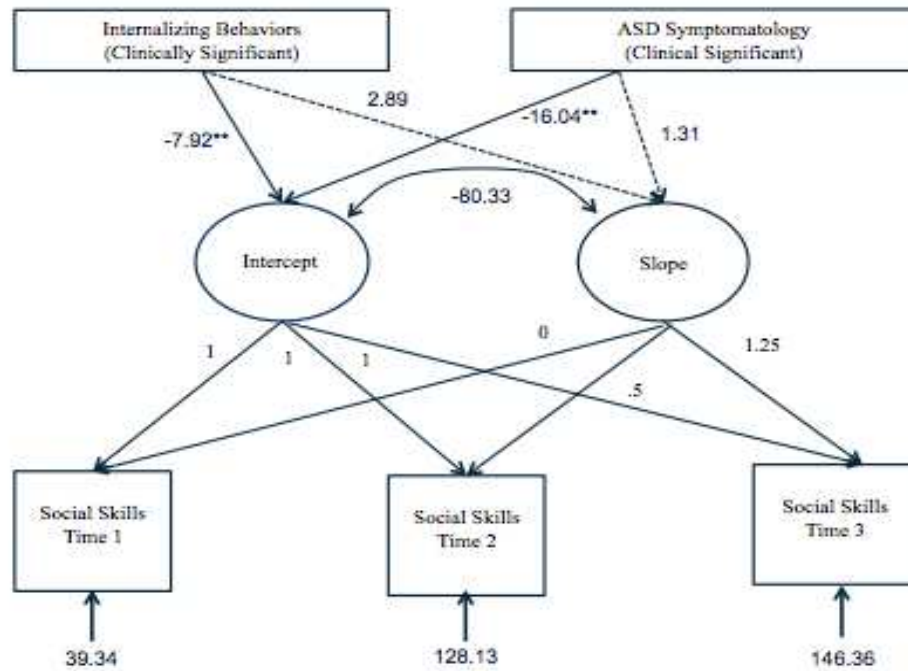


Figure 2. Latent growth curve model—parent report model. Final model with predictor variables.

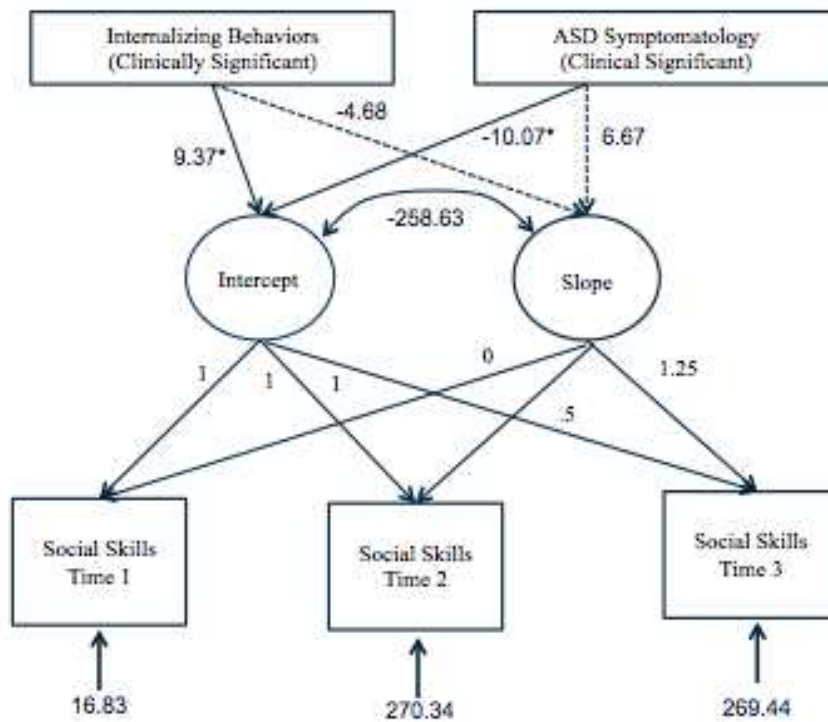


Figure 3. Latent growth curve model—teacher report model. Final model with predictor variables.