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Predicting Self-Esteem and Depressive Symptoms from Social Skills in Youth With and Without Autism Spectrum Disorder

by

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Abstract

Youth with autism spectrum disorder (ASD) are at increased risk for low self-esteem and depressive symptomatology. Poor social skills may be associated with depression and self-esteem in ASD populations, yet these relationships remain understudied. Previous studies are limited by lack of comparison between youth and parent report of social skills and lack of comparisons to clinically relevant samples. This study seeks to compare predictive relationships between parent and youth-reported social skills, self-esteem, and depressive symptoms across youth with ASD and youth with similar clinical vulnerabilities. Hierarchal regression analyses revealed that youth-reported social skills account for significant variance in self-esteem, parent-reported social skills account for significant variance in depressive symptoms, and self-esteem accounts for significant variance in depressive symptoms. Moderation analyses revealed that relationships between youth-reported social skills and self-esteem and between self-esteem and depressive symptoms had smaller effects in the ASD group, while the relationship between parent-reported social skills and depressive symptoms had a larger effect in the ASD group. Results indicate that poor social skills and self-esteem are risk factors for depression among children and adolescents with ASD. Additionally, results suggest ASD-related factors influence the relationships between social skills, self-esteem, and depression. Implications for clinical practice and future directions are discussed.
Youth diagnosed with autism spectrum disorder (ASD) experience elevated rates of co-occurring psychopathology compared to the general population (Brereton et al., 2006; Leyfer et al., 2006; Mayes et al., 2011; Mazzone et al., 2013; Rosen et al., 2018; Simonoff et al., 2008). Of particular concern is depressive symptomatology, given its relationship with lower life satisfaction, lower quality of life, increased risk of suicidality, lower adaptive functioning, social difficulties and poor outcomes in adulthood (Gadow et al., 2008; Ghaziuddin et al., 2002; Gotham et al., 2015; McCauley et al., 2020; Pezzimenti et al., 2019; Rao & Chen, 2009). Symptoms of depression in children include irritability, excessive sadness or hopelessness, lack of motivation, feelings of worthlessness, lack of pleasure, and trouble focusing (American Psychiatric Association, 2013; Magnuson & Constantino, 2011). A growing body of evidence suggests autistic youth experience internalizing psychopathology, including depression, at higher rates than both typically developing peers and peers with other developmental delays (Brereton et al., 2006; DeFilippis, 2018; Mayes et al., 2011; Mazzone et al., 2013; McPheeters et al., 2011; Pezzimenti et al., 2019; Rosen et al., 2018; Schwartzman & Corbett, 2020; Simonoff et al., 2008). Given elevated rates, identifying risk factors and targets for intervention in ASD populations is crucial.

Low self-esteem and poor social skills place non-autistic youth at risk for depressive symptomatology (Hames et al., 2013; Kuster et al., 2012; Orth et al., 2008, 2014; Rao & Chen, 2009; Segrin, 2000). Growing evidence suggests these factors may place children with ASD at increased risk as well (DeFilippis, 2018; Gadow et al., 2008; McCauley et al., 2017; van der Cruijsen & Boyer, 2021; Vickerstaff et al., 2007; Yarger & Redcay, 2020). However, despite much research comparing depressive symptoms between autistic and non-autistic children, little research has examined differences in predictive relationships. In particular, individuals with
ASD exhibit unique challenges that may influence their views of themselves and their social abilities, contributing to symptoms of depression (Butzer & Konstantareas, 2003; McCauley et al., 2017; Williamson et al., 2008). Specifically, compared to typically developing youth, youth on the autism spectrum have pervasive difficulties with typical social communication and interaction, difficulties with social and emotional understanding (Theory of Mind) and decreased social motivation (Baron-Cohen, 2000; Chevallier et al., 2012; Happé & Frith, 1995; Huang et al., 2017; Lombardo & Baron-Cohen, 2011) as well as less peer and societal acceptance (Bauminger et al., 2004; Cage et al., 2018a; Cage et al., 2018b; Pouw et al., 2013; Whitehouse et al., 2009; Williamson et al., 2008). Given these differences between ASD and non-ASD populations, predictive relationships between social skills, self-esteem and depressive symptoms may differ between those with and without ASD. Yet, little is known about how similarly or differently these risk factors operate in autistic youth.

**Self-Esteem**

Self-esteem refers to how positive or negative one perceives themselves to be, regardless of their actual attributes (Beane & Lipka, 1980; Donnellan et al., 2013; McConnell, 2011). Terms relating to the self are often used interchangeably in the literature, but are generally thought to refer to separate, yet related, constructs (Bailey, 2003; Beane & Lipka, 1980; Harter, 1999), with self-esteem often characterized as affective, evaluative judgements on the self. Self-esteem is thought to exist both at a global (e.g., overall sense of worth) and domain specific (e.g., academic competence, physical appearance) level (Donnellan et al., 2013; Rosenberg et al., 1995). Self-esteem involves both one’s perception of themselves as well as other’s perceptions in social contexts (Harter, 1999, 2012). For the purposes of this study, self-esteem refers to a more
global perception of self and is defined as one’s perception of their overall competency and self-worth (Beck et al., 2005; Bose-Deakins & Floyd, 2004; Harter, 1999).

**Self-Esteem and Depression in Typically Developing Populations**

As children develop, they internalize feedback from parents, peers, and other adults and use this information to evaluate areas of competency as well as judgements of their worth (Harter, 2012; Mann et al., 2004). Negative self-esteem can lead to depression through rumination on self-worth, attribution style for negative and positive life events, and negative feedback seeking (Frewen & Dozois, 2006; Hames et al., 2013; Kuster et al., 2012; Mann et al., 2004; Rueger & George, 2017). Consistent with this conceptualization, self-esteem is related to depression in non-ASD populations (Lee & Stone, 2012; Mann et al., 2004; Orth et al., 2008, 2014; Ybrandt, 2008). Moreover, it appears that low self-esteem is a vulnerability for depression rather than an outcome (Orth et al., 2008). Given that low self-esteem is a risk factor for depression, it follows that having a more positive self-esteem might be protective against potential mental health problems. Indeed, research indicates that high self-esteem has a compensatory effect on the development of internalizing disorders (Gilman & Huebner, 2006; Steinhausen & Metzke, 2001; Ybrandt, 2008). Therefore, bolstering self-esteem in youth can promote positive mental health and prevent depressive symptomatology.

**Self-Esteem and Depression in Autistic Populations**

Compared to the general population, autistic youth demonstrate lower self-esteem and self-worth (Capps et al., 1995; Cooper et al., 2017; Hebron & Humphrey, 2014; Jamison & Schuttler, 2015; Mayes et al., 2011; McCauley et al., 2017; McPheeters et al., 2011; van der Cruijsen & Boyer, 2021). Recent research indicates self-esteem is a meaningful construct for autistic youth’s mental health (McCauley et al., 2017; van der Cruijsen & Boyer, 2021), despite
concerns that limitations in social insight and Theory of Mind (ToM) may affect development of the self and self-related perceptions in ASD (Baron-Cohen, 2000; Huang et al., 2017; Lombardo & Baron-Cohen, 2011).

There is an unfortunate paucity of research examining the relationship between self-esteem and depressive symptoms in ASD. In one study of children and adolescents with ASD, McCauley and colleagues found that self-esteem predicted depressive symptoms in ASD and non-ASD groups. Furthermore, autistic youth with more insight into social interactions (fewer ToM deficits) had lower self-esteem, indicating that youth who are more socially attuned may be incorporating negative peer feedback and social challenges into their view of themselves (McCauley et al., 2017). Relationships between self-esteem and depressive symptoms did not differ between ASD and non-ASD groups, suggesting that, as with typically developing populations, low self-esteem makes youth with ASD vulnerable to depression. Accordingly, a recent study revealed that low self-esteem was associated with higher reports of depression in children with ASD (van der Cruijzen & Boyer, 2021). However, this relationship was not compared to individuals without a diagnosis of ASD. Finally, in a study of autistic adults, self-esteem was negatively related to symptoms of anxiety and depression (Cooper et al., 2017). These studies provide preliminary support for self-esteem as a risk factor for depressive symptoms in autistic populations, but more research is needed to corroborate these findings.

**Social Skills and Depression in Non-ASD Populations**

Poor social skills are relevant to both self-esteem and depressive symptoms in non-ASD populations. Social skills, sometimes referred to as social competence or social ability, refers to the ability to use verbal and nonverbal social skills to develop and maintain appropriate social interactions (Gresham & MacMillan, 1997; Segrin, 2000; Vickerstaff et al., 2007). Segrin (2000)
outlines three different ways that social skills and depression may be related in typically developing populations. Poor social skills may cause depression by limiting reinforcement in the social environment. Depression may cause poor social skills due to social withdrawal, feelings of worthlessness, and lack of motivation. Finally, poor social skills may put one at risk for depression in the face of negative life events, such that individuals with poor social skills are likely to experience more interpersonal stressors but have less social support needed to cope (Segrin, 2000). Poor social skills are likely both a precursor for and an outcome of depression, but may be more of a risk factor in childhood especially (Rao & Chen, 2009; Segrin, 2000).

Research among typically developing youth indicates an association between poor social functioning, interpersonal difficulties, and mental health outcomes, including depression and low self-esteem (Hames et al., 2013; Mann et al., 2004; Rao & Chen, 2009; Segrin, 2000).

**Social Skills and Depression in ASD Populations**

Because ASD is associated with pervasive difficulties in social communication, individuals with ASD struggle to initiate and maintain social interactions and relationships (American Psychiatric Association, 2013; Petrina et al., 2014). Some youth with ASD may be more attuned to their social difficulties, leading them to feel more negatively about their abilities and putting them at risk for depressive symptomatology (Capps et al., 1995; Hebron & Humphrey, 2014; Meyer et al., 2006; Vickerstaff et al., 2007; Yarger & Redcay, 2020). Additionally, many autistic children and adolescents desire social interaction and friendships (Calder et al., 2013; Mazurek, 2014; Petrina et al., 2014; Sosnowy et al., 2019), but do not have the needed skills to attain success, leading them to feel lonely and depressed (Bauminger et al., 2004; Mazurek & Kanne, 2010; Smith & White, 2020). Accordingly, poor social competencies
have been found to predict depressive symptomatology (Burton et al., 2020; Butzer & Konstantareas, 2003; Ratcliffe et al., 2015; Vickerstaff et al., 2007).

The literature suggests several factors that could affect the relationship between social skills and depressive symptoms in ASD populations. Specifically, youth who have stronger cognitive abilities (Capps et al., 1995; Vickerstaff et al., 2007), Theory of Mind (McCauley et al., 2017), and social interest (Mazurek & Kanne, 2010; Smith & White, 2020) might be particularly cognizant of social difficulties, putting them at even greater risk for depression. This may also be true for children who make more social comparisons (Hedley & Young, 2006), and attribute social failures to their effort or ability (Barnhill, 2001). Overall, this suggests associations between social competence and depressive symptomatology vary across youth with ASD, such that social difficulties may matter more to some children than others. One consequence is that the overall relationship between social skills and depressive symptoms would not be as strong as compared to non-ASD populations, but research has not yet compared these relationships. Examining interactions with diagnosis would help clarify whether social skills are related to depression in a similar nature across ASD and non-ASD individuals, and whether differences can be attributed to ASD characteristics.

Self-Perception of Social Skills

Importantly, autistic children’s perception of their social abilities may be more relevant for their mental health than abilities described by their parents. While multiple studies have examined relationships between parent-reported social skills and depression (Burton et al., 2020; Johnston & Iarocci, 2017; Ratcliffe et al., 2015) and youth-reported social skills and depression (Jamison & Schuttler, 2015; Whitehouse et al., 2009; Williamson et al., 2008), only a few studies have assessed relationships across parent and youth-report. In a study of 21 youth with ASD,
self-perceived social competence was lower than normative samples by parent and child report and was associated with cognitive ability (Vickerstaff et al., 2007). Lower self-perceived social competence was associated with greater depressive symptomatology, but this relationship was not observed for parent report (Vickerstaff et al., 2007). Meyer and colleagues found that parent-rated social competence was not related to emotional problems, but youth reported social competence was (Meyer et al., 2006). Unfortunately, depression specifically was not examined in that study, limiting the findings. Finally, youth who reported lower social competence were actually rated as having higher social functioning by their parents (Capps et al., 1995). Together, these findings suggest that youth who report worse social skills are more likely to exhibit depressive symptoms, regardless of how parents perceive their social functioning, potentially because youth who are aware of their social challenges may be more negatively affected by these difficulties. Further research is needed to assess this hypothesis by comparing relationships between social skills and depressive symptoms across parent and youth-report. Additionally, research has not yet addressed whether self-reported social skills predict low self-esteem, despite the relevancy of self-esteem to depression.

One potential concern when studying self-reported social abilities in youth on the spectrum is that youth tend to report social skills at higher levels than their parents, indicating some children may have limited social-emotional insight or have an inflated sense of competency (Lerner et al., 2012; Lombardo & Baron-Cohen, 2011; Vickerstaff et al., 2007). However, discrepancies in parent and child reported social skills are found in the general population as well. Cross-informant agreement on social skills emerges as only weak to moderate in non-ASD populations, and a recent meta-analysis suggests the magnitude of informant discrepancies for parent and self-report in ASD is similar to TD youth (Stratis &
Lecavalier, 2015). This suggests that using multiple raters provides richer information (Gresham et al., 2010). Further, individuals with ASD do rate social skills as important, though this may differ based on the type of skill and the level of ASD-related deficits (Rankin et al., 2016). Overall, using self-report in addition to parent report of social skills in ASD is a useful tool to more wholly assess functioning (Ozsivadjian et al., 2014; Rankin et al., 2016; Stratis & Lecavalier, 2015), yet is not consistently done in autism research. This study aims to address this gap by including both parent and youth reports of social abilities.

**Lack of Clinically Relevant Comparison Groups**

A limitation in the current literature is a lack of studies examining relationships between negative self-esteem, social skills, and depression in ASD and non-ASD samples Exploring relationships between these variables only in ASD populations limits our understanding of whether social skills, self-esteem, and depression are operating similarly or differently in youth with ASD. Of note, McCauley and colleagues did include ASD diagnosis as a moderator and found no significant interaction in the relationship between self-esteem and depression. Another study showed that while ASD youth demonstrated lower peer likability and peer-related competencies, this was only predictive of depressive symptomatology in a typically developing group (Williamson et al., 2008). Williamson et al. (2008) also found that peer-related competencies predicted overall self-worth in ASD and non-ASD children, but these peer-related competencies were not specifically capturing social skills.

More specifically, the existent literature is lacking studies using a clinically relevant comparison group. ASD youth may differ from those without ASD in ways that are not specific to autism, including but not limited to poorer executive, adaptive and social functioning, academic difficulties, and behavioral problems (Demetriou et al., 2018; Estes et al., 2011; Fenton
et al., 2003; Kenworthy et al., 2010; Matson et al., 2008; Wallace et al., 2016). By using typically developing comparison groups, it is more difficult to attribute differences to ASD characteristics specifically. Making comparisons to samples with similar clinical vulnerabilities, including adaptive, cognitive, and executive functioning difficulties yields greater insight into the nature of any observed differences, namely that differences are more likely attributable to ASD-related factors. Examining the effect of ASD on predictive relationships between social competence, self-esteem, and depressive symptoms will produce useful information about the nature of these constructs in autism and lead to relevant conclusion regarding salient factors for screening and intervention of depression.

**The Present Study**

The current study aims to address multiple gaps in the current literature by comparing relationships between self and parent-reported social skills, self-reported self-esteem, and self-reported depressive symptoms in an ASD and a clinically relevant, non-ASD sample. We will control for chronological age and cognitive ability, given evidence that both age (DeFilippis, 2018; Gotham et al., 2015; Greenlee et al., 2016; Pezzimenti et al., 2019; Picci & Scherf, 2015; Rosen et al., 2018) and IQ are related to depressive symptoms (Brereton et al., 2006; Edirisooriya et al., 2020; Greenlee et al., 2016; Lerner et al., 2018; Mayes et al., 2011; Mazurek & Kanne, 2010). Specifically, this study aims to:

1. Evaluate if self-reported social skills and parent-reported social skills predict self-esteem, respectively, and if there is an interaction with diagnosis. Based on findings that social competency is related to self-esteem in non-ASD populations (Mann et al., 2004; Rosenberg et al., 1995; Williamson et al., 2008), we predict that self-reported social skills will predict self-esteem, such that youth who identify fewer social skills
will report lower self-esteem. We also predict that parent-reported social skills will not predict self-esteem because youth perceptions of social skills will be more relevant to their self-esteem. We further predict that the relationship between self-reported social skills and self-esteem will be weaker in the ASD population, given that social awareness, social motivation, and cognitive ability may influence perception of social abilities in ASD youth (McCauley et al., 2017; Smith & White, 2020; Vickerstaff et al., 2007).

2. Evaluate if self-reported social skills and parent-reported social skills predict depressive symptoms, respectively, and if there is an interaction with diagnosis. Based on findings that self-reported social competency is related to depressive symptoms in ASD and non-ASD populations (Mann et al., 2004; Segrin, 2000; Vickerstaff et al., 2007), we predict that self-reported social skills will predict depressive symptoms. In line with Vickerstaff et al (2007), we predict that parent-reported social skills will not be associated with depressive symptoms. We further predict that the relationship between self-reported social skills and depressive symptoms will be weaker in the ASD population, given that social awareness, social motivation, and cognitive ability may influence perception of social abilities in ASD youth (McCaeley et al., 2017; Smith & White, 2020; Vickerstaff et al., 2007).

3. Replicate findings that self-esteem predicts depressive symptoms (McCaeley et al., 2017; van der Cruijsen & Boyer, 2021), and assess if there is an interaction with diagnosis. Based on the finding that self-esteem is equivalently related to depression in TD and ASD populations (McCaeley et al., 2017), we predict that there will not be an interaction with diagnosis.
Method

Participants

Participants were 110 children and adolescents who received a comprehensive autism evaluation through the Center for Autism and Related Disabilities (CARD) at the University at Albany, State University of New York. All individuals had a full-scale IQ greater than or equal to 70 ($M = 99.35$, $SD = 13.05$). Full-scale IQ values ranged from 72 to 128. Participants ranged from 6 to 18 years ($M = 11.83$, $SD = 3.24$) and 73% percent were male. Within the sample, 68 individuals (62%) received an autism spectrum disorder diagnosis. Of those who received an ASD diagnosis, 28% were also diagnosed with attention-deficit hyperactivity disorder (ADHD), 29% also received an anxiety disorder diagnosis, and 9% also received a diagnosis of unspecified depressive disorder. Of the 42 individuals not diagnosed with ASD, 45% received an ADHD diagnosis, 52% received an anxiety disorder diagnosis, and 14% received a diagnosis of unspecified depressive disorder. See Table 1 for detailed demographic information.

Procedure

Use of the evaluation data for the current study was approved by the Office of Regulatory Research Compliance’s Institutional Review Board (IRB). Participants were recruited for comprehensive autism evaluations through flyer dissemination to local community mental health practices, local schools, and local pediatric practices. The comprehensive autism evaluations were also listed on the CARD website. The comprehensive autism evaluation consisted of clinical interviews with parents and/or caregivers to obtain detailed psychosocial and developmental histories; record review; evaluation of intellectual functioning, adaptive functioning, social skills, and executive functioning; assessment of co-occurring mental health symptoms; and evaluation of autism symptoms through direct observation utilizing a gold-
standard autism diagnostic assessment. Evaluations were completed across two separate dates and were conducted by one of two licensed clinical psychologists with extensive experience working with and diagnosing autistic individuals. Autism diagnosis was determined based on Diagnostic and Statistical Manual of Mental Disorders-5th Edition criteria for autism spectrum disorder, data from the current evaluation, and clinical impression (DSM-5; APA, 2013). All parents received a comprehensive written report with the results of the evaluation and clinical recommendations as well as an in-person feedback session with the clinical psychologist.

In the present study, data was isolated to individuals who completed the Beck Youth Inventories, 2nd Edition (Beck et al., 2005) and whose parent had completed the Social Skills Improvement System Rating Scales (N = 110) (SSIS; Gresham & Elliot, 2008). A subset of children (N = 86) had also self-completed the SSIS. The smaller subset was used for analyses involving social skills, while the full sample was used to assess relationships between self-esteem and depression.

Measures

Autism Diagnostic Observation Schedule, Second Edition

Autism diagnostic testing was conducted using the Autism Diagnostic Observation Schedule – Second Edition (ADOS-2; Lord et al., 2012). The ADOS-2 is a clinician-administered, semi-structured observation assessment that uses a series of behavioral presses that allow for observation of autistic behaviors and traits. The ADOS-2 has five modules designed to meet children’s age and developmental level. Module Three, designed for children and young adolescents who are verbally fluent, was administered to 99 individuals and Module Four, designed for adolescents and adults who are verbally fluent, was administered to 24 individuals. Immediately following administration of the ADOS-2, the child’s social interaction,
communication, and restricted and repetitive behaviors were coded and scored. Children who met criteria on the ADOS-2 and presented with autism symptoms according to clinician impression received a diagnosis of autism spectrum disorder. Accompanying intellectual and/or language impairment was indicated. Severity levels for social communication and RRBs were rated separately by the clinical psychologist based on the criteria in the DSM-5 (Level 1 = requiring support, Level 2 = requiring substantial report, Level 3 = requiring very substantial report).

**Vineland Adaptive Behavior Scales, Second and Third Editions**

To assess adaptive functioning, the *Vineland Adaptive Behavior Scales - Second Edition* (VABS-II; Sparrow et al., 2005) or the *Vineland Adaptive Behavior Scales – Third Edition* (VABS-3; Sparrow et al., 2016) survey interview was conducted. Individuals assessed before the release of the VABS-3 were assessed using the VABS-II. The VABS survey interview is a clinician-administered, standardized, norm-referenced assessment tool used to assess adaptive behavior in social, communication, daily living, and motor domains in individuals ages 3 – 90. The VABS-II and VABS-3 provides a standard score for overall adaptive behavior (Adaptive Behavior Composite) as well as for the above-mentioned domains. Standard Scores have a mean of 100 and standard deviation of 15. The VABS-II and VABS-3 Adaptive Behavior Composite scores were used to characterize the adaptive functioning level of the current sample.

The VABS-II and VABS-3 demonstrate a high level of internal consistency (Adaptive Behavior Composite coefficients ranging from .93-.98) and test-retest reliability (Adaptive Behavior Composite coefficients ranging from .80 - .92) (Sparrow et al., 2005, 2016) as well as indicators of validity (Pepperdine et al., 2018). Unique score profiles for autism and other
developmentally delayed groups indicate validity for children with ASD (Sparrow et al., 2005, 2016).

**Behavior Rating Inventory of Executive Function, First and Second Editions**

The Behavior Rating Inventory of Executive Function – First Edition (BRIEF, Gioia et al., 2000) or Behavior Rating Inventory of Executive Function – Second Edition (BRIEF-2, Gioia et al., 2015) Parent Form was completed by caregivers to assess the child’s executive functioning. Individuals assessed before the release of the BRIEF-2 were assessed using the BRIEF. The BRIEF and BRIEF-2 are standardized parent-report measures for children aged 5-18 that capture executive function and self-regulation. The BRIEF and BRIEF-2 yield a raw score for Global Executive Composite score (GEC) as well as scores in the domains of cognitive, behavioral, and emotion regulation. Raw scores are converted to t scores with a mean of 50 and standard deviation of 10 based on age and sex-normed samples. For the purposes of the current study, only the GEC was used to characterize overall executive functioning abilities of the sample.

Parents indicate on a 3-point scale whether their child “Never” (0), “Sometimes” (1), or “Often” (2) exhibits a variety of behaviors related to planning, organization, flexibility, working memory, emotional control, and task completion. The measure demonstrates good internal consistency (BRIEF: coefficients range from .8 - .98; BRIEF-2: coefficients range from 0.76 to 0.97) test-retest reliability (BRIEF: .82; BRIEF-2: .88), and validity as demonstrated by correlation with other measures of behavior and cognitive ability (Gioia et al., 2000, 2015; Hendrickson & McCrimmon, 2019).

**Stanford Binet Intelligence Scales, Fifth Edition**
Participants’ cognitive ability was measured with the *Stanford-Binet Intelligence Scales – Fifth Edition* (SB-5; Roid, 2003). The SB-5 provides a full-scale IQ, non-verbal IQ, and verbal IQ. Only full-scale IQ scores were used in the current study. Full-scale IQ scores represent the ability to reason, solve problems, recall information, visualize and explain information and apply knowledge using information presented in verbal and non-verbal (e.g., pictorial, symbolic, or figural) form. IQ scores have a mean of 100 and standard deviation (SD) of 15.

The SB-5 demonstrates a high level of internal consistency for IQ scores (average coefficients ranging from .95–.98; Roid, 2003). Validity of the SB-5 for children with ASD is demonstrated by a high convergence with other commonly used intelligence tests and the presence of distinctive score profiles for numerous special groups, including individuals with ASD (Baum et al., 2014; Roid, 2003).

**Social Skills Improvement System**

Parents and children independently completed the *Social Skills Improvement System Rating Scales*, Parent and Student (SSIS; Gresham & Elliot, 2008), a standardized, 79-item Likert-scale measure that evaluates social skills and problem behavior in youth ages 3-18. When scored, the measure produces a standard score for those two domains. Standard scores have a mean of 100 and standard deviation of 15. The Social Skills domain assesses the use of prosocial skills and includes seven subscales measuring Communication, Cooperation, Assertion, Responsibility, Empathy, Engagement, and Self-Control. The SSIS Social Skills Standard Score (*SSIS-SS*) was used to assess social competency as reported by youth and by their parents, with higher scores representing better social competence (sample items: “I try to make new friends”, “I take turns when I talk to others”).
Parents and children indicate the frequency with which the child exhibits each social skill and problem behavior using a 4-point scale from 0 (never) to 3 (almost always). Behavioral levels are assigned to indicate whether the child is below average, average, or above average on each domain and subscale. The SSIS shows high internal consistency for all domains (Social Skills: $\alpha = .97$) and sufficient test-retest reliability (parent = .72-.88; youth = .59-.81) (Gresham et al., 2008, 2011). Validity is demonstrated by relationships with other measures of social skills and distinct scores for individuals with social, emotional, and communicative impairments (Gresham et al., 2008; Crosby, 2011). The SSIS is a widely used measure for assessing social skills in ASD populations specifically (Freeman & Cronin, 2017).

**Beck Youth Inventories, Second Edition**

As part of the comprehensive autism evaluation, children and adolescents completed the Beck Youth Inventories, 2nd Edition (BYI-II; (Beck et al., 2005), a self-report assessment of internalizing and externalizing mental health problems. The BYI-II consists of five self-report inventories, each containing 20 statements, assessing the following domains: Depression, Anxiety, Anger, Disruptive Behavior, and Self-Concept. Each inventory is scored independently of the others and can be used separately or in conjunction with the other scales to determine a clinical profile.

The Depression Inventory (BDI-Y) was used to assess depressive symptoms (Sample item: “I feel sad”). The Self-Concept Inventory (BSCI-Y) was used to assess self-esteem (sample item: “I like myself”). Factor analyses of the BSCI-Y reveal that it captures both perceptions of positive qualities (competency) and self-liking (self-esteem) (Beck et al., 2005; Bose-Deakins & Floyd, 2004; Steer et al., 2005) On each inventory, children indicated how frequently each statement is true for them on a 4-point scale from 0 (“never”) to 3 (“always”). The child receives
a raw score ranging from 0 to 60 on each inventory, which is converted to a \( T \) score with a mean of 50 and standard deviation of 10. \( T \) scores are normed based on sex (male or female) and age (7-10, 11-14, or 15-18). \( T \) scores are categorized into clinical ranges. On the \textit{BDI-Y}, \( T \) scores less than 55 are in the average range, \( T \) scores ranging from 55 - 59 are in the mildly elevated range, \( T \) scores from 60 - 69 are in the moderately elevated range, and \( T \) scores 70 or greater fall in the extremely elevated range. On the \textit{BSCI-Y}, \( T \) scores less than 40 fall in the much-lower-than-average range, \( T \) scores ranging from 40 - 44 fall in the lower-than-average range, \( T \) scores ranging from 45 - 55 fall in the average range, and \( T \) scores greater than 55 falls in the above average range.

The \textit{BYI-II} demonstrates high internal consistency in all domains for both males and females and within all age groups (Depression: \( \alpha \) range .90-.95; Self-Concept: \( \alpha \) range .89-.92). Test-retest reliability ranges from .74 to .93 across age group and sex (Beck et al., 2005). The \textit{Beck Youth Inventories} have been validated in special education, community, and clinical samples and demonstrate construct validity as evidenced by correlations with other measures of internalizing and externalizing symptoms (Beck et al., 2005).

**Data Analytic Plan**

Prior to analysis, regression assumptions were assessed for all study variables. All models predicting self-esteem met assumptions of linearity, homoscedasticity, and normality of residuals. Evaluation of assumptions in models predicting depressive symptoms indicated non-normality of residuals using the Shapiro-Wilk normality test. Upon further inspection, it appeared that BDI-Y depression scores were positively skewed due to two cases that reported particularly high depressive symptoms. Analyses were conducted with and without the two cases and results did not change appreciably, therefore the cases were included in all analyses. A
natural logarithm transformation was applied to BDI-Y depression scores. Following transformation, all regression assumptions were met. Transformed scores were used in all subsequent analyses. All continuous predictors were mean centered prior to entry. Diagnosis was coded to center around 0 (-.5 = No ASD, .5 = ASD) so that coefficients for social skills in the final model represented the overall effect in the sample, regardless of diagnoses. To control for potential inflation of $R^2$ due to entering multiple predictors, adjusted $R^2$ was used.

**Aim One:** To assess if self-reported social skills and parent-reported social skills predict self-concept after controlling for IQ and age and if parent and self-reported social skills interact with diagnosis, two separate hierarchal multiple regressions was conducted; one with self-reported social skills and one with parent-reported social skills. Age and IQ were entered in the first step, social skills were entered in the second step, diagnosis was entered in the third step, and the interaction term was entered in the fourth step. One-way ANOVAs were conducted to assess significant change in adjusted $R^2$ between each step of the model.

**Aim Two:** To assess if self-reported and parent-reported social skills predict depressive symptoms after controlling for IQ and age, and if self and parent-reported social skills interact with diagnosis, separate hierarchical multiple regressions for self-reported and parent-reported social skills were conducted. Steps of the regression were identical to analyses for Aim One. One-way ANOVAs were conducted to assess significant change in adjusted $R^2$ between each step of the model.

**Aim Three:** To assess if self-esteem predicted depression scores, and if self-esteem interacted with diagnosis, a hierarchical multiple regression was conducted. Age and IQ were entered in the first step, self-esteem was entered in the second step, ASD diagnosis was entered in the third step, and the interaction term was entered in the fourth step.
Results

All analyses were conducted in R-Studio version 1.3.1073 (RStudio Team, 2020). Hierarchical multiple regressions, t tests, and Pearson r correlations were conducted using the stats package version 4.0.2 (R Core Team, 2020). Simple slopes analyses were conducted using the emmeans package version 1.5.0 (Lenth, 2020) and the interactions package version 1.1.3 (Long, 2019). Regression assumptions were assessed using the gvlma package version 1.0.0.3 (Pena & Slate, 2019) and multicollinearity was assessed using the car package version 3.0-9 (Fox & Weisberg, 2019).

Descriptive Statistics

To establish the clinical profiles of the ASD and non-ASD groups and assess similarities and differences, independent t tests were conducted. Youth with ASD had significantly higher ADOS-2 comparison scores than youth not diagnosed with ASD, t(106) = -12.70, p < .001, consistent with the diagnosis. Average Global Executive Composite (GEC) scores were in the clinically elevated range (t score above 70) for both the ASD and non-ASD groups. Groups did not differ based on global executive functioning based on the BRIEF (t(33) = .66) or BRIEF-2 (t(65) = 0.69, all p’s > .05. Average Adaptive Behavior Composite (ABC) scores on the VABS-II and VABS-3 fell well below the normative mean of 100 for both ASD and non-ASD groups. Due to unequal variances, a Welch’s t test was run to compare adaptive functioning between the groups on the VABS-3 while an independent samples t test was run for the VABS-II scores. Analysis revealed a significant group difference for adaptive behavior on the VABS-3, such that the ASD group demonstrated worse adaptive functioning than the non-ASD group, t(65.04) = -2.62, p < .05. Similar results were found for the VABS-2 such that youth with ASD had poorer
adaptive functioning than non-ASD youth, $t(37) = -2.93, p < .01$. Overall, both groups demonstrated clinically significant challenges in both executive and adaptive functions.

Independent sample $t$-tests were also run to assess if there were any significant differences between the ASD and non-ASD group on study variables. The groups did not differ on full-scale IQ ($t(108) = -.68$), self-reported social skills ($t(83) = -1.07$), parent-reported social skills ($t(108) = -.88$), self-esteem ($t(108) = -.28$), or depressive symptoms ($t(108) = -1.11$), all $p$’s $>$ .05. On average, parents in both ASD and non-ASD groups reported social skills in the below average range ($T$ score $< 85$) while youth in both groups reported social skills in the average range. There was a significant age difference between groups, such that the ASD group was significantly older than the non-ASD group, $t(108) = 2.73, p < .01$. Descriptive data is presented in Table 1.

Scores on the BYI-II were further examined to establish levels of self-esteem and depressive symptoms in the sample. Mean scores for depressive symptoms and self-esteem fell in the average range for both groups. In the full sample, 59% reported depressive symptoms in the average range, 14% reported symptoms in the mildly elevated range, 20% reported symptoms in the moderately elevated range, and 7% reported symptoms in the extremely elevated range. In the ASD group, 53% reported depressive symptoms in the average range, 18% reported symptoms in the mildly elevated range, 22% in the moderately elevated range, and 7% in the clinically elevated range. In the non-ASD group, 69% reported depressive symptoms in the average range, 7% reported symptoms in the mildly elevated range, 17% reported symptoms in the moderately elevated range, and 7% reported symptoms in the clinically elevated range. Percentages did not differ by diagnostic group, $\chi^2(3) = 3.62, p > .05$. 

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For self-esteem, 53% of the full sample reported self-esteem in the average or above average range, 14% reported self-esteem in the lower-than-average range, and 34% reported self-esteem in the much lower-than-average range. In the ASD group, 49% reported self-esteem in the average or above average range, 19% reported self-esteem in the lower-than-average range, and 32% reported self-esteem in the much lower-than-average range. In the non-ASD group, 60% reported self-esteem in the average or above average range, 5% reported self-esteem in the lower-than-average range, and 36% reported self-esteem in the much lower-than-average range. Percentages did not differ by diagnostic group, $\chi^2(2) = 4.61, p > .05$. Overall, both groups demonstrated similar levels of depressive symptoms and negative self-esteem.

Aim One: Self-Esteem

Self-Reported Social Skills

Adjusted R-square, adjusted R-squared change, regression coefficients and test statistics are presented in Table 2. In the first step, age and IQ were entered as predictors. The overall model was not significant at the .05 level, but trended toward significance, accounting for 4.25% of the variance in self-esteem scores, $F(2, 83) = 2.89, p = .06$. Chronological age significantly predicted self-esteem scores, such that as age increased, self-esteem decreased, $b = -.97, t(83) = -2.40, p < .05$. IQ did not significantly predict self-esteem, $p > .05$.

In the second step self-reported social skills were added to the model as a predictor, significantly accounting for an additional 21.88% of the variance in self-esteem scores, $F(1, 82) = 25.05, p < .001$. The overall model was significant, with the linear combination of age, IQ, and social skills accounting for 21.51% of the variance in self-esteem scores, $F(3, 82) = 10.83, p < .001$. IQ remained an unsignificant predictor. Age continued to significantly predict self-esteem scores, $b = -.76, t(82) = -2.12, p < .05$. Self-reported social skills significantly predicted self-
esteem scores such that increased social skills were associated with increased self-esteem scores, 
\[ b = .33, t(82) = 5.00, p < .001. \]

In the third step, to assess whether diagnosis predicted self-esteem scores, diagnosis was added as a predictor. Adding ASD diagnosis did not significantly increase the variance accounted for by the model, \( F(1, 81) = 6.62, p > .05. \) ASD diagnosis did not significantly predict self-esteem scores, however the overall model was still significant, \( F(4, 81) = 8.05, p < .001. \)

In the fourth and final step, the interaction between diagnosis and self-reported social skills was added to assess if the relationship between social skills and self-esteem differed between ASD and non-ASD groups. The interaction accounted for an additional 2.86\% of the variance in self-esteem scores, \( F(1, 80) = 4.21, p < .05. \) The overall full model was significant, accounting for 27.78\% of the variance in self-esteem scores, \( F(5, 80) = 7.54, p < .001. \) Age remained a significant predictor, \( b = -.86, t(80) = -2.32, p < .05. \) The interaction term significantly predicted self-esteem scores, \( b = -.27, t(80) = 2.05, p < .05. \) To characterize the nature of the interaction, simple slopes analysis was conducted.

The slope of social skills and self-esteem scores was calculated for ASD and non-ASD youth and compared between groups. The slope was significant in both groups, (non-ASD: \( t(80) = 4.87, p < .001; \) ASD: \( t(80) = 2.50, p < .05 \)). However, the relationship between self-reported social skills and self-esteem was significantly stronger in the non-ASD (\( b = .49 \)) than in the ASD group (\( b = .22 \)), \( t(80) = 2.05, p < .05. \) See Figure 1.

**Parent-Reported Social Skills**

Adjusted \( R \)-square, adjusted \( R \)-squared change, regression coefficients and test statistics are presented in Table 3. In the first step, age and IQ were entered as predictors. The overall model was not significant, \( F(2, 83) = 2.89, p > .05. \)
In the second step, parent-reported social skills were entered as a predictor. The change in \( R^2 \) was not significant, \( F(1, 81) = 1.77, p > .05 \). The overall model was not significant, \( F(3, 81) = 2.30, p > .05 \). Parent reported social skills did not significantly predict self-esteem.

ASD diagnosis was added as a predictor in the third step. ASD diagnosis did not significantly predict additional variance in self-esteem, \( F(1, 80) = .01, p > .05 \). The overall model was not significant, \( F(4, 80) = 1.70, p > .05 \).

In the final step, the interaction of parent-reported social skills and ASD diagnosis was added to the model. The change in \( R^2 \) was not significant, \( F(1, 79) = .05, p > .05 \). The final model was not significant \( F(5, 79) = 1.36, p > .05 \).

**Aim Two: Depressive Symptoms**

**Self-Reported Social Skills**

Adjusted \( R^2 \), adjusted \( R^2 \) change, regression coefficients and all test statistics are presented in Table 4 for the model. To facilitate interpretation, exponentiated \((e^b)\) untransformed beta weights are presented alongside the transformed coefficients in Table 4.

In the first step, IQ and age were entered as predictors. The overall model was not significant, \( F(2, 83) = 1.93, p > .05 \). Neither IQ or age were significant predictors within the model, \( p \)'s > .05. In the second step, self-reported social skills were added as a predictor. Adding social skills significantly increased the variance accounted for in depressive symptoms, accounting for an additional 7.83% of the variance in depression scores, \( F(1, 82) = 8.21, p < .01 \). Overall, the model was significant, accounting for 9.96% of the variance in depression scores, \( F(3, 82) = 4.14, p < .01 \). Self-reported social skills were the only significant predictor in the model, \( b = -.004, t(82) = -2.87, p < .01 \).
In the third step, diagnosis was entered in the model. The overall model was significant, \(F(4, 81) = 3.10, p < .05\). Adding diagnosis did not account for a significant additional amount of variance in depression scores, \(F(1, 81) = .12, p > .05\). Self-reported social skills remained the only significant predictor in the model. In the fourth and final step, the interaction between diagnosis and social skills was entered. Adding the interaction accounted for an additional 3.71% of the variance in self-esteem scores, a significant amount, \(F(1, 80) = 4.44, p < .05\). The final model was significant, accounting for 12.70% of the variance in depression scores, \(F(5, 80) = 3.47, p < .01\). The interaction was a significant predictor of depression scores, \(b = .006, t(80) = 2.11, p < .05\).

To characterize the nature of the interaction, simple slopes analysis was performed. The slope of social skills and depression scores was calculated for ASD and non-ASD youth and compared between groups. The relationship between social skills and logarithmically transformed depression symptoms was significantly stronger in the non-ASD group \((b = -.008)\) than in the ASD group \((b = -.002)\), \(t(80) = 2.11, p < .05\). The slope was non-significant in the ASD group \((t(52) = -2.8, p > .05)\), but significant in the non-ASD group \((t(32) = -3.48, p < .001)\). The natural logarithm coefficient is interpreted in the original metric as the exponentiated coefficient minus one, multiplied by 100 (Gelman & Hill, 2006). For each one unit increase in self-reported social skills, when age and IQ are held constant, depression scores decrease by about .8% in the non-ASD group, but only by .2% in the ASD group. The interaction is presented in Figure 2.

**Parent-Reported Social Skills**
Adjusted $R^2$, adjusted $R^2$ change, regression coefficients and all test statistics for the model are presented in Table 5. To facilitate interpretation, exponentiated ($e^b$) untransformed beta weights are presented alongside the transformed coefficients in Table 5.

In the first step, IQ and age were entered in the model. The overall model was not significant, $F(2, 83) = 1.93, \ p > .05$. In the second step, parent-reported social skills were added to the model. Adding social skills to the model did not account for additional variance, $F(1, 81) = .10, \ p > .05$. The overall model was not significant, $F(3, 81) = 2.02, \ p > .05$.

In the third step, ASD diagnosis was added to the model. Diagnosis did not account for additional variance in the model, $F(1, 80) = .11 \ p > .05$. The overall model was not significant, $F(4, 80) = 1.53, \ p > .05$.

In the fourth and final step, the interaction of diagnosis and social skills was added. Adding the interaction accounted for an additional 5% of the variance in depression scores, $F(1, 79) = 5.31, \ p < .05$, a significant amount. The overall model was significant, accounting for 7.45% of the variance in depression scores, $F(5, 79) = 2.35, \ p < .05$. The interaction term was the only significant predictor, $b = -.007, \ t(79) = -2.31, \ p < .05$.

To follow-up the significant interaction, simple slopes analysis was conducted. The relationship between parent-reported social skills and depression in the ASD group was significantly stronger ($b = -.006$) than in the non-ASD group ($b = .001$), $t(79) = 2.31, \ p < .05$. The relationship was not significant in the non-ASD group ($t(32) = .49, \ p > .05$), but was in the ASD group ($t(52) = -2.77, \ p < .05$. Specifically, examining exponentiated coefficients revealed that, when age and IQ are held constant, for each one unit increase in parent-reported social skills, self-reported depression scores of ASD youth decreased by .6%, while in the non-ASD group, scores increased by .1%. The interaction is presented in Figure 3.
Aim Three: Self-Esteem and Depression

Adjusted $R$ square, adjusted $R$ squared change, regression coefficients and test statistics are presented in Table 6. To facilitate interpretation, exponentiated ($e^b$) untransformed beta weights are presented alongside the transformed coefficients in Table 6.

IQ and age were entered in the first step, this model was the same as the first model in the regression of depression and parent-reported social skills described above. In the second step, self-esteem was added to the model, accounting for a significant additional 18.75% of the variance in depression scores, $F(1, 106) = 26.87, p < .001$. Self-esteem significantly predicted depression scores, $b = -.009, t(106) = -5.18, p < .001$. Age was no longer a significant predictor once self-esteem was added to the model, $t(106) = .89, p > .05$. Predictors can become non-significant if multicollinearity is present. Variance inflation factors were calculated for the model to assess for multicollinearity and were in the normal range for all variables, indicating multicollinearity was not an issue.

In the third step, diagnosis was added to the model. Diagnosis did not account for a significant additional proportion of variance in depression scores, $p > .05$. The overall model was significant, $F(4, 105) = 8.80, p < .001$, with self-esteem as the only significant unique predictor. In the fourth and final step, the interaction of self-esteem and depression was added to the model. The interaction accounted for an additional 3.22% of the variance in depression scores, a significant amount, $F(1, 104) = 5.54, p < .05$. Overall, the final model was significant, accounting for 25.48% of the variance in depression scores, $F(5, 104) = 8.46, p < .001$.

To characterize the nature of the interaction, simple slopes analysis was conducted to compare the slopes of self-esteem and depression scores in the ASD and non-ASD group. The strength of the slopes significantly differed between groups, with a stronger association in the
non-ASD ($b = -.013$) than the ASD group ($b = -.005$), $t(104) = -2.35, p < .05$. The slopes in both the non-ASD ($t(41) = -5.37, p < .001$) and the ASD ($t(67) = -2.27, p < .05$) groups were significant. Specifically, for each one unit increase in self-esteem, depression scores decrease by 1.27% in the non-ASD group and by only .51% in the ASD group. The interaction is documented in Figure 4.

**Discussion**

The current study examined predictive relationships between parent and youth-reported social skills, self-esteem, and depression across an ASD and clinically relevant non-ASD sample. We found multiple meaningful differences in the relationships based on parent and self-report and in youth with and without ASD that yielded several important insights about social skills, depressive symptoms, and self-esteem in ASD populations. Encouragingly, results also indicate multiple targets for preventing depression among youth with ASD.

**Youth and Parent Report of Social Skills**

Consistent with hypotheses, we found that lower self-reported social skills, but not parent-reported social skills, partially explain youth ratings of low self-esteem. This finding is similar to that of Williamson et al. (2008), who found that self-reported peer competencies predicted global self-worth in youth with ASD. Extending upon their finding, we showed that self-esteem is specifically predicted by social competency, and that self-esteem is not predicted by parent-reported social competency. While parents of autistic children report poor social skills, their concerns do not seem to impact how positively or negatively their child views themselves. This pattern of results demonstrates that the child’s own perception of their social difficulties is more important for their esteem than an outside observer’s perception of their difficulties. Our results suggest that some children and adolescents on the spectrum identify their social
difficulties and incorporate them into their self-view in a negative manner. One potential mechanism explaining this relationship may be social attribution. Children with ASD report difficulty managing social relationships, feeling “weird”, and less acceptance from peers (Bauminger et al., 2004; Hebron & Humphrey, 2014; Humphrey & Lewis, 2008; Humphrey & Symes, 2011; Portway & Johnson, 2003) which could contribute to poor mental health if these social difficulties are attributed to effort and ability (Barnhill, 2001). A significant amount of variance in self-esteem was unexplained by age, IQ, and social skills, indicating that other factors are important for the self-esteem of youth with and without ASD. Overall, little research has focused on self-perceived social ability and overall self-esteem in autism. Though replication is necessary, our results contribute a preliminary finding that children’s negative perceptions of their social functioning places them at risk for low self-esteem.

We also found, in line with our hypotheses, that self-esteem predicted depressive symptoms in both ASD and non-ASD populations, accounting for about 19% of the variance in depressive symptoms. While our effect was smaller than observed previous studies, our result lends support to previous findings that low self-esteem is a risk factor for depression among children with ASD (McCauley et al., 2017; van der Cruijsen & Boyer, 2021). Importantly, our study used different measures of both self-esteem and depressive symptoms than prior studies, providing additional robustness to this conclusion. Moreover, neither McCauley et al (2017) or van der Cruijsen and Boyer (2021) controlled for age, despite evidence that self-esteem decreases in adolescence (Harter, 2012). Our results indicate that low self-esteem places youth with ASD at risk for depression, regardless of age. This highlights the importance of forming positive self-perceptions in ASD, especially given high rates of depression (Mayes et al., 2011; Mazzone et al., 2013; Simonoff et al., 2008). Our study demonstrates that self-esteem is a
clinically meaningful construct for youth with ASD and is associated both with lower social competency and greater depressive symptomatology. Furthermore, we suggest low self-esteem could be a potential mechanism by which autistic youth with poor social skills become depressed.

Surprisingly, we found that while self-reported social skills did not predict depressive symptoms in ASD, parent-reported social skills did. This finding was contrary to our hypothesis and relationships described in the literature (Ratcliffe et al., 2015; Vickerstaff et al., 2007). This is especially surprising given that youth-report of social skills predicted low self-esteem, which was associated with depressive symptoms. The lack of relationship between self-reported social skills and depressive symptoms is initially concerning, suggesting that better social skills do not necessarily benefit the mental health of youth with ASD. However, the relationship based on parent-report indicates that social skills are systematically associated with depressive symptomatology. Given the inconsistency with previous results and with our other findings, results are interpreted with caution.

One interpretation is that regardless of youth’s awareness of their social weaknesses, these difficulties are impacting their mental health. Research indicates that autistic youth experience greater peer victimization and bullying, in part due to social-communication difficulties (Cappadocia et al., 2012; Forrest et al., 2020; Humphrey & Hebron, 2015; Schroeder et al., 2014), which contributes to internalizing symptoms (Adams et al., 2014; Humphrey & Hebron, 2015; Williamson et al., 2008). Additionally, youth with limited social understanding may make more hostile attributions, leading to poor mental health outcomes (Lerner et al., 2012; Meyer et al., 2006). It may be that parents are noticing these social skill deficits, while youth are only noticing the effects of the social deficits on their mood and well-being. Finally, given that
Depressive symptoms can compound social difficulties in ASD (DeFilippis, 2018; Gotham et al., 2015; Johnston & Iarocci, 2017), parents might have picked up on the social consequences of their child’s depressive symptoms.

**Differences Between ASD and Non-ASD Youth**

We found several differences in the relationships between social skills, self-esteem, and depressive symptoms between youth with and without ASD. Consistent with hypotheses, we found a significantly weaker relationship between self-reported social skills and self-esteem among children with ASD. One implication is that youth who report greater social strengths still have comparatively lower self-esteem as opposed to their non-ASD counterpart. Improving social skills will have a less drastic impact on self-esteem for children on the spectrum, indicating the need to identify multiple ways to benefit the self-esteem of youth with ASD, given its associations with depressive symptoms. To our knowledge, this is the first study to document this finding.

Contrary to hypotheses, but consistent with the interaction described above, we also found a weaker effect of self-esteem on depressive symptoms in youth with ASD as compared to those without ASD. This is inconsistent with a previous study that found no differences in the relationship between self-esteem and depression across TD and ASD youth (McCauley et al., 2017). Our sample was slightly larger, suggesting we may have had more power to identify this interaction. Alternatively, our comparison group may explain differences. In our sample, self-esteem and depression may have been highly related in the non-ASD group because they were a clinic-referred sample, experiencing significant clinical vulnerabilities in multiple areas of functioning. The non-ASD group may have had comparatively more insight into the challenges they faced in social, academic, and behavioral domains, placing them at higher risk for
psychopathology than typically developing and autistic youth. Including both a clinically relevant and typically developing control group in future studies could help sort out these effects.

Finally, self-reported social skills predicted depressive symptoms in youth without ASD, but this relationship was not significant in youth with ASD. Parent-reported social skills displayed the opposite effect. Compared to youth without ASD, children with autism report similar levels of depressive symptoms regardless of their perceived social ability. By contrast, when parents report fewer social skills, only children with ASD systematically report high levels of depressive symptoms. It is compelling that parent of children without ASD did not report social skill deficits associated with depression, suggesting that children with ASD are exhibiting unique social weaknesses that lead to depression, regardless of whether they perceive these difficulties.

The multiple interactions found in this study imply that ASD-specific factors are impacting the relationship between social skills, self-esteem, and depression. Specifically, the non-ASD sample had adaptive and executive functioning levels below average, but did differ in terms of ASD symptomatology, indicating that autism-specific characteristics likely explain the differences in the relationships. Importantly, heterogeneity of traits on the spectrum (Georgiades et al., 2013; Volkmar et al., 2004), means social skills and self-esteem may be more important for some children than others, leading to an overall weaker effect. While this study cannot indicate specifically which unique ASD factors influence this relationship, the literature points to several potential candidates including Theory of Mind, social motivation, and cognitive ability.

Deficits in Theory of Mind, or the cognitive capacity to infer others’ mental states, are often observed in ASD and are thought to contribute to the social-communication symptoms of ASD (e.g., Baron-Cohen, 2000). Furthermore, better Theory of Mind has been associated with
lower self-esteem (McCauley et al., 2017). Children with worse Theory of Mind may have limited insight into the difficulties they have in social interactions, and therefore do not incorporate negative perceptions of their abilities into their overall esteem, buffering them from the negative effects.

Differences in social motivation could also explain the weaker effect among ASD children. Overall, children with ASD exhibit lower social motivation (Chevallier et al., 2012). However recent findings suggest that some, but not all, individuals with ASD desire social interaction and friendships (Calder et al., 2013; Mazurek, 2014; Petrina et al., 2014; Sosnowy et al., 2019), but have difficulty with the needed skills to attain success. A compelling new theory posits that individuals on the spectrum with higher social motivation experience a mismatch between their desire for social relationships and their limited social abilities, leading to loneliness, putting them at greater risk for depression (Smith & White, 2020). Those with lower social motivation, however, would not exhibit this association. Therefore, it may be that some children in our sample were more socially motivated, leading them to be more negatively affected by their social difficulties, but that others had low social motivation and were less bothered by their impairment. Whereas in the non-ASD sample, social motivation may have been higher across the board, causing a stronger association between social skill deficits and poor mental health.

Finally, some researchers have suggested cognitive ability is related to both social competence and depressive symptomatology because children with greater cognitive ability would be more aware of their social difficulties (Brereton et al., 2006; Capps et al., 1995; Edirisooriya et al., 2020; Vickerstaff et al., 2007). However, our ASD and non-ASD groups exhibited a comparable range of cognitive ability, and IQ was controlled for in all analyses. It
therefore seems less likely that weaker relationships between study variables in ASD are not due to variations in intelligence. Of course, neither Theory of Mind nor social motivation was assessed in this study, limiting the conclusions we can draw. Formal investigation of factors that may moderate predictive relationships between social skills, self-esteem, and depressive symptoms in ASD populations are warranted based on this study to find potential explanations for weaker relationships and ascertain whether subsets of children on the spectrum are at particular risk for depression.

**Limitations and Future Directions**

Finally, there are several limitations in the current study worth noting. First, comprehensive assessment and diagnosis of depression was not carried out in this study. Instead, we examined relationships with symptoms of depression, and therefore cannot conclude whether social skills and self-esteem are risk factors for clinical depression. Though a handful of individuals in our sample were diagnosed with a depressive disorder, numbers were too small to analyze differences. Like this study, other similar studies have also only examined symptoms of depression (e.g., McCauley et al., 2017; van der Cruijsen & Boyer, 2021; Vickerstaff et al., 2007). Future studies should examine social competency and self-esteem in populations of clinically depressed youth with ASD to understand the degree of risk conferred by these constructs.

Second, while we hypothesize about how social deficits and self-esteem lead to the development of depressive symptoms, the cross-sectional nature of our data limits findings. Prospective longitudinal studies that examine risk during different developmental periods will help us better understand how depression develops in ASD. Notably, the onset of puberty may exacerbate vulnerability to depression due to social and biological changes (Greenlee et al.,
Future directions include examining the temporal precedence of various risk factors for depression in ASD as well as investigating how risk factors, such as social ability and low self-esteem, interact with negative life events across the developmental life span to cause depression.

Third, our study did not have sufficient sample size to examine potential gender differences. As the field begins to understand important differences in the presentation of ASD in males and females (see Hull et al., 2020; Kirkovski et al., 2013 for a review), gender comparisons are increasingly warranted. Consistent with evidence from the general population that women and girls are at increased risk for depression, growing research in ASD populations demonstrates similar findings (Jamison & Schuttler, 2015; Oswald et al., 2016; Schwartzman & Corbett, 2020; Solomon et al., 2012; Wijnhoven et al., 2019). Studies seeking to examine risk factors for depression should aim to compare relationships and rates between males and females, overrecruiting females if necessary.

Finally, while one strength of this study is the use of multiple raters of social skills, only child reports of self-esteem and depressive symptoms were obtained. Information may have been lost by not assessing parent-report of symptoms. Research shows that children with ASD may underreport psychopathology compared to their parents (Lopata et al., 2010; Vickerstaff et al., 2007), suggesting that findings may have been greater if parent report had been included. Assessment of ASD should endeavor to include parent and youth-report measures of social skills, as this will provide broader perspective on the child’s perception of their abilities and richer understanding of potential mental health concerns.

Clinical Implications
Our results have several clinical implications for assessment and practice. One implication from our results, in combination with other studies, (e.g., Ratcliffe et al., 2015; Vickerstaff et al., 2007; Whitehouse et al., 2009) is that social skills interventions may have positive impacts on mental health for youth with ASD. Indeed, some social skill interventions have demonstrated benefits on both self-esteem and depressive symptoms (Broderick et al., 2002; Hillier et al., 2007; Solomon et al., 2004), but these outcomes remain understudied. Given relationships between social skills, self-esteem, and depressive symptoms found in this study, social skill intervention studies should consider including measures of self-esteem and depression to assess if improving social abilities has direct impacts on mental health of youth on the spectrum.

Clinicians working with autistic youth should also consciously focus on boosting self-esteem. This could be accomplished through social skills training, as described above, or traditional cognitive-behavioral methods. Research in autistic adults indicates that positive autism identity may buffer against depressive symptoms by improving collective and personal self-esteem (Cooper et al., 2017) and children report that their autism label helps them understand their differences (Hebron & Humphrey, 2014; Mogensen & Mason, 2015). In the context of our study this is especially compelling, because youth had not yet received a diagnosis of ASD. Diagnosis, and disclosure of diagnosis, may provide an opportunity to bolster self-esteem and foster positive autism identity (Humphrey & Lewis, 2008; Mogensen & Mason, 2015; Riccio et al., 2021) While social skills might help autistic youth think of themselves more positively by improving their social abilities, individuals with ASD will likely continue to struggle in typical social situations. Social skills interventions may benefit from explicit, additional strategies to improve self-esteem such as positive autism identity. Teaching youth
with ASD about their differences and to identify strengths could help them form a more positive self-esteem and build resiliency against poor mental health.

Finally, our results indicate that youth who are referred for autism assessment but do not receive a diagnosis may be especially vulnerable to low self-esteem and depressive symptoms. Clinicians who conduct diagnostic evaluations should thoroughly assess mental health and be sure to provide mental health recommendations. Our results further underscore the utility of obtaining parent and self-report of ASD-related symptoms and of screening for mental health symptoms when assessing youth with ASD.

In summary, this study found that youth who reported fewer social skills were more likely to report low self-esteem, and that youth who reported low esteem were more likely to exhibit depressive symptoms, but these effects were stronger for youth without ASD. ASD-related characteristics may impact the effect of social skills and self-esteem on depression. Additionally, parent of autistic children may observe social challenges that lead to depressive symptoms. Results suggest that social skills and self-esteem are risk factors for depressive symptoms in ASD, whether children and adolescents perceive these difficulties or not.
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### Table 1. 
**Demographic and Descriptive Statistics**

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<td>Female, n (%)</td>
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<td>Depression, n (%)</td>
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<td>6 (14%)</td>
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* * significant at the $p < .05$ level  
** ** significant at the $p < .01$ level
Table 2.  
*Results of the Multiple Regression Analyses of Self-Esteem and Self-Reported Social Skills*

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*significant at the p < .05 level  
** significant at the p < .01 level  
***significant at the p < .001 level
Table 3.
Results of the Regression of Self-Esteem and Parent Reported Social Skills

*significant at the p < .05 level
**significant at the p < .01 level
***significant at the p < .001 level

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** significant at the p < .01 level
*** significant at the p < .001 level
Table 4.  
Results of the Regression of Depressive Symptoms and Self-Reported Social Skills

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*significant at the p < .05 level  
** significant at the p < .01 level  
***significant at the p < .001 level
Table 5.
*Results of the Regression of Depression and Parent-Reported Social Skills*

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*significant at the $p < .05$ level
** significant at the $p < .01$ level
***significant at the $p < .001$ level
Table 6.  
Results of the Regression of Depression and Self-Esteem

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* significant at the \( p < .05 \) level  
** significant at the \( p < .01 \) level  
*** significant at the \( p < .001 \) level
Slopes for both ASD ($\beta = .30$) and non-ASD ($\beta = .67$) are significant. Slopes significantly differ between groups, $p < .05$.  

Figure 2.  
*Depressive Symptoms and Self-Reported Social Skills in ASD and non-ASD Youth*
Slope for ASD ($\beta = -.12$) and non-ASD ($\beta = -.41$) significantly differed between groups, $p < .05$. The slope for ASD was not significant, while the slope for non-ASD was significant. Figure 3.

Depressive Symptoms and Parent-Reported Social Skills in ASD and non-ASD Youth

Slopes for ASD ($\beta = -.41$) and non-ASD ($\beta = .05$) significantly differed between groups, $p < .05$. The slope for ASD was significant, while the slope for non-ASD was not significant. Figure 4.
Slopes for ASD (β = -.32) and non-ASD (β = -.46) significantly differed between groups, \( p < .05 \). The slope for both groups were significant, \( p < .05 \).