Gender Differences in Relations Between Internalizing Symptoms and Social Motivation Among Autistic and Non-Autistic Youth

by

Meryssa Waite

B.Sc. (Hons.), University of Victoria, 2021

Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts

in the
Department of Psychology
Faculty of Arts and Social Sciences

SIMON FRASER UNIVERSITY
Fall 2023

Declaration of Committee

Name:	**Meryssa Waite**
Degree:	**Master of Arts (Psychology)**
Title:	**Gender Differences in Relations Between Internalizing Symptoms and Social Motivation Among Autistic and Non-Autistic Youth**
Committee:	**Chair:** **John McDonald** Professor, Psychology
	Grace Iarocci Supervisor Professor, Psychology
	Rachel Fouladi Committee Member Associate Professor, Psychology
	Connor Kerns Examiner Associate Professor, Psychology University of British Columbia

Ethics Statement

The author, whose name appears on the title page of this work, has obtained, for the research described in this work, either:

a. human research ethics approval from the Simon Fraser University Office of Research Ethics

or

b. advance approval of the animal care protocol from the University Animal Care Committee of Simon Fraser University

or has conducted the research

c. as a co-investigator, collaborator, or research assistant in a research project approved in advance.

A copy of the approval letter has been filed with the Theses Office of the University Library at the time of submission of this thesis or project.

The original application for approval and letter of approval are filed with the relevant offices. Inquiries may be directed to those authorities.

Simon Fraser University Library
Burnaby, British Columbia, Canada

Update Spring 2016

Abstract

The current study examined relations between internalizing symptoms, social motivation, gender, and age among autistic and non-autistic youth. Caregivers of 386 participants ages 6 to 14 completed measures of their child's internalizing symptoms and social motivation. Correlation and regression analyses were conducted to compare internalizing symptoms and social motivation across gender, diagnosis, and age. Social motivation was found to be higher among non-autistic participants compared to autistic participants, with no significant gender differences observed in social motivation within groups. Relations between social motivation and internalizing symptoms were found to vary with gender and diagnosis. Specifically, associations between internalizing symptoms and social motivation were similar across autistic girls, non-autistic girls, and non-autistic boys, while internalizing symptoms and social motivation were more closely related among autistic girls compared to autistic boys. These findings contribute to our understanding of gender differences in internalizing symptoms and social motivation by illustrating how these factors, and the relations between them, vary across autistic and non-autistic girls and boys.

Keywords: Autism Spectrum Disorder; Internalizing Symptoms; Social Motivation; Gender; Youth

Acknowledgements

I respectfully acknowledge that this research took place on the unceded traditional territories of the Coast Salish peoples, including the səl̓ilw̓ətaʔɬ (Tsleil-Waututh), kʷikʷəƛ̓əm (Kwikwetlem), Sḵwx̱wú7mesh Úxwumixw (Squamish), and xʷməθkʷəy̓əm (Musqueam) Nations.

I would like to express my sincere gratitude and appreciation for my supervisor, Dr. Grace Iarocci. I am also very grateful for the guidance and feedback provided by my committee member, Dr. Rachel Fouladi. I wish to thank all members of the Autism and Developmental Disabilities Lab. Thank you to Shane and my family for their support and encouragement. Lastly, I am sincerely grateful to the youth and their families who participated in this research.

Table of Contents

List of Tables

List of Figures

Chapter 1.

Introduction

The high prevalence of co-occurring internalizing problems in autistic individuals is poorly understood (Ratcliffe et al., 2015). Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by differences in social communication and interactions, along with restricted and repetitive behaviours or interests (APA, 2022). Many of the mental health problems autistic youth experience may be a consequence of their social experiences. There is evidence that internalizing problems and social motivation in autistic youth are linked (e.g., Briot et al., 2020). Social motivation is an important aspect of social competence and refers to one's interest in initiating and maintaining social relationships (Yager & Iarocci, 2013). When examining relations between internalizing problems and social motivation, gender differences are of interest, as autistic girls tend to present with more internalizing symptoms than autistic boys (e.g., Lundin et al., 2021; Solomon et al., 2012). Autistic girls may also have higher levels of social motivation compared to autistic boys (e.g., Sedgewick et al., 2016). These gender differences in internalizing symptoms and social motivation may be influenced in part by the intersecting social expectations associated with the diagnosis and gender identities of autistic girls (Saxe, 2017). Specifically, while social stereotypes portray autistic individuals as uninterested in social connections, girls are often expected to desire close interpersonal relationships, leaving autistic girls to navigate conflicting social expectations (Saxe, 2017).

The purpose of the current study was to explore relations between internalizing symptoms, social motivation, gender, and age among autistic and non-autistic youth. In the following, the high prevalence of internalizing symptoms in autistic individuals is first discussed. Next, the current literature on internalizing problems and social motivation among autistic youth is summarized. The methodology and findings of the current study are then described, followed by an interpretation of the results. Lastly, theoretical and social implications of these findings are discussed, and suggestions for future research are presented. Throughout, identity-first language will be used, as this is the terminology currently preferred by those in the autism community (Botha et al., 2021; Bottema-Beutel et al., 2021; Bury et al., 2020).

1.1. Autism and Internalizing Symptoms

The prevalence of internalizing disorders is higher among autistic individuals compared to the general population. The DSM-5-TR (APA, 2022) states that around 70% of autistic people have at least one co-occurring mental disorder. One literature review (Lugo-Marín et al., 2019) found that depression and anxiety are two of the most commonly co-occurring disorders with autism. Internalizing disorders have been found to be more common in autistic children (e.g., Kerns et al., 2020), adolescents (e.g., Jamison & Shuttler, 2015), and adults (e.g., Hollocks et al., 2019), compared to the general population.

Empirical research has established that autistic youth are at an increased risk for experiencing internalizing problems. For example, the 2019 Canadian Health Survey (Statistics Canada, 2019) reported higher prevalence rates of anxiety disorders (23%) and mood disorders (6%) among autistic Canadian youth, compared to non-autistic Canadian youth (5% and 2%, respectively). In a study examining the presentation of anxiety in autistic children, Kerns et al. (2020) found that over half of their participants met diagnostic criteria for an anxiety disorder. Similarly, in a study examining the prevalence of anxiety in autistic youth, Vasa et al. (2013) found that more than 40% of their autistic adolescent participants presented with clinically significant anxiety. The prevalence of depressive disorders is also heightened among autistic youth, with those on the autism spectrum being four times more likely to experience depression than neurotypical individuals (Pezzimenti et al., 2019). Similar to anxiety disorders, depressive disorders become increasingly common in autistic individuals throughout childhood and adolescence (Pezzimenti et al., 2019). Although prevalence rates vary across studies, the existing literature consistently demonstrates higher rates of internalizing problems among autistic individuals compared to non-autistic individuals.

There are many factors that have been proposed to explain the high prevalence of internalizing problems amongst autistic individuals, including experiences of ableism, negative social interactions, and peer rejection (Saxe, 2017). More research is required to better understand the high rates of internalizing problems experienced by autistic youth and how this is related to their social experiences. It is also important to note that although high rates of co-occurring internalizing problems and autism have been established, the prevalence of internalizing problems in autistic youth varies across

studies, and these discrepancies are likely due to sampling selection methods, assessment measures, and diagnostic overshadowing (Briot et al., 2020).

1.2. Autism and Social Motivation

One way of better understanding the high prevalence of internalizing problems among autistic individuals may be through further examining their social experiences. The social experiences of autistic individuals are impacted by differences in social competence. Social competence is a broad, multidimensional construct which encompasses social responsiveness, social understanding, and emotion regulation (Yager & Iarocci, 2013). Social motivation is a component of social competence that refers to one's interest in social relationships (Scheeren et al., 2016; Yager & Iarocci, 2013). Individuals high in social motivation approach others, enjoy social interactions, and work towards maintaining social relationships.

The social motivation theory of autism (Chevallier et al., 2012) posits that reduced social motivation may underlie challenges in social communication and interaction in autistic individuals. This theory proposes that the social behaviours of autistic individuals reflect a lack of social interest and an aversion to social stimuli. Further, autistic individuals are described as having extremely diminished social motivation, where the drive to seek social acceptance and avoid social rejection is reduced (Chevallier et al., 2012). While lower social motivation in autistic individuals compared to neurotypical individuals has been supported by research (e.g., Corbett et al., 2014), this theory has also been contested. Existing research provides stronger support for interindividual variability in social motivation among autistic individuals (e.g., Bauminger-Zvively & Kimhi, 2017; Eaton, 2017; Mundy, 2019). The social motivation theory of autism has also been disputed by those with lived experience (Jaswal & Akhtar, 2019).

Attributing social difficulties experienced by autistic individuals to a lack of social motivation may fail to acknowledge the active role of all parties involved in social interactions, namely that both autistic and non-autistic individuals often experience difficulties in understanding one another. Social-deficit models of autism have been said to align with the medical model of disability, which holds that disabilities are impairments of the individual that should be cured (Kapp, 2019). In contrast, the double empathy

problem (Milton, 2012) acknowledges that while autistic individuals may lack insight into the minds of neurotypical people, neurotypical people too lack insight into the minds of autistic individuals. In other words, autistic individuals face difficulties in social interactions because they both misunderstand others and are misunderstood by others (Mitchell et al., 2021). This is supported by testimonies from autistic people, who have voiced that their social behaviours are often misinterpreted by neurotypical people (Jaswal & Akhtar, 2019). For example, autistic participants and researchers have attributed behaviours of autistic individuals, such as diminished eye contact, to processes other than deficits in social motivation, such as social anxiety (Jaswal & Akhtar, 2019; Kapp et al., 2019; Mundy, 2019).

There is a growing body of research emphasizing the variability in autistic youths' social motivation. Autistic youth may have, on average, lower social motivation than neurotypical children; however, social motivation varies widely across autistic youth and is not uniformly diminished (Neuhaus et al., 2021). Autistic children have been described to be extremely driven to develop friendships and as desiring interpersonal interactions (Bauminger-Zviely & Kimhi, 2017). While certain autistic youth appear disinterested in social relationships, others actively seek out social interaction (Trevisan et al., 2018). The ongoing discussion about the varying levels of social motivation across autistic individuals has been a longstanding topic. For example, in their characterization of the social behaviours of autistic youth, Wing and Gould (1979) described four styles of social approach, highlighting the substantial range of social motivation seen within this group decades ago.

The differences in social motivation across autistic youth are also reflected in the varied use of social camouflaging. Social camouflaging has been said to reflect typical or high levels of social motivation in autistic individuals (Livingston et al., 2019). Autistic individuals often use social camouflaging as a tactic to conceal differences in social competence during social interactions, such as by forcing themselves to make eye contact, or explicitly controlling their facial expressions (Hull et al., 2017). Other methods of social camouflaging include imitation and rehearsing social scripts (Lai et al., 2017). Autistic children often engage in social camouflaging to better conform to social expectations and to fit in with their neurotypical peers (Mitchell et al., 2021). Two of the most common reasons for social camouflaging are to fit in and to avoid bullying (Cage & Troxell-Whitman, 2019). Autistic individuals social camouflage to improve social

interactions and to meet societal expectations (Hull et al., 2017). Therefore, the high prevalence of social camouflaging among autistic individuals may challenge social-deficit models of autism and instead provide evidence for complex and driven social behaviours, a desire for a sense of belonging, awareness of social expectations, and insight into differences in one's own social competence (Mitchell et al., 2021).

Although it has been proposed that diminished social motivation is fundamental to autism, empirical research and testimonies from those with lived experience provide support for variability in social motivation across autistic individuals (Jaswal & Akhtar, 2019; Neuhaus et al., 2021). Social-deficit models of autism are common (Kapp et al., 2019); however, they fail to consider the role of the social environment and the reciprocal nature of interpersonal interactions in interpreting the behaviours of autistic individuals.

1.3. Autism, Internalizing Symptoms, and Social Motivation

Difficulties with social competence have been associated with various mental health outcomes in autistic individuals, including anxiety (Briot et al., 2020), depression (Johnston & Iarocci, 2017; Pouw et al., 2013) and suicidality (Lai & Szatmari, 2020). It has been proposed that the relations between mental health and social competence in autistic individuals may be best described as reciprocal (Johnston & Iarocci, 2017). Mental health symptoms may impair social competence, and impaired social competence may further stress one's mental wellbeing. Social competence is necessary for successful peer relationships, and social competence is also learned through interacting with peers (Bauminger-Zviely & Kimhi, 2017; Semrud-Clikeman, 2007). However, autistic individuals often experience difficulties in forming these peer relationships which promote the development of social competence and benefit wellbeing (Bauminger-Zviely & Kimhi, 2017). For example, in a study on friendship and internalizing symptoms in autistic youth, nearly one quarter of participants reported having no peer relationships (Mazurek & Kanne, 2010).

Previous research has established relations between social motivation and internalizing symptoms in autistic individuals. It has been proposed that difficulties in social motivation and social communication may increase one's risk of experiencing social anxiety (Briot et al., 2020). Autistic individuals with low social motivation may feel

anxious in social interactions, and autistic individuals high in social anxiety may be more likely to avoid social interactions and, therefore, have limited opportunities to develop social motivation (Bellini, 2004). However, autistic individuals who avoid social interactions may be doing so because of anxiety rather than diminished motivation (Swain et al., 2015). Many autistic individuals experience social difficulties despite self-reporting high social motivation and attribute these social difficulties to feelings of anxiety (Kapp et al., 2019). Therefore, it is likely that a subset of autistic individuals are highly socially motivated, however, their behaviour may not reflect this due to experienced internalizing symptoms (Swain et al., 2015; Sedgewick et al., 2016).

1.3.1. Gender Differences in Internalizing Symptoms and Social Motivation

Autistic girls may experience more internalizing symptoms and higher social motivation compared to autistic boys. The prevalence of internalizing symptoms and social competence difficulties is higher among autistic individuals than non-autistic individuals (APA, 2022; Johnston & Iarocci, 2017). Additionally, girls often experience more internalizing symptoms and must navigate more complex peer relationships than boys (Jamison & Schuttler, 2015; Rosenfield & Mouzon, 2012). Together, this leaves autistic girls especially vulnerable to experiencing social and mental health challenges. The intersecting diagnosis and gender identities of autistic girls have been considered a “double hit” (Solomon et al., 2012, p. 49).

Autistic women have reported being alienated from both the autism community and from other women, due to feeling as though they do not conform to the stereotypes associated with either of these social identities (Saxe, 2017). Therefore, the social experiences of autistic girls and women may be best understood using an intersectionality perspective, which considers the social norms and beliefs surrounding both their gender and neurodivergent identities (Saxe, 2017). Further, girls are underrepresented in the existing literature on autism, and it has been argued that current conceptualizations of autism are based on a male-phenotype (Rivett & Matson, 2011; Wood-Downie et al., 2021). However, there is now a growing body of research (e.g., Sedgewick et al., 2019) that demonstrates the unique presentation of autism in girls and emphasizes the importance of supports that reflect these experiences.

In support of considering the intersecting diagnosis and gender identities of autistic youth together, empirical research has begun to establish the higher social motivation and internalizing problems experienced by autistic girls. A higher prevalence of anxiety and eating disorder symptoms has been found in non-male autistic individuals compared to male autistic and non-autistic individuals (Sedgewick et al., 2020). Similarly, adolescent autistic girls have been found to present with more internalizing symptoms than autistic boys and neurotypical girls (Solomon et al., 2012). While the research on gender differences in social motivation is limited, there is some evidence that autistic girls may also be more socially motivated than autistic boys (Lundin et al., 2021; Sedgewick et al., 2016). For example, one study found that adolescent autistic girls exhibited higher social motivation than both adolescent autistic and non-autistic boys (Sedgewick et al., 2016).

Although autistic girls may appear to experience fewer social competence difficulties than autistic males, this may instead reflect higher social motivation leading to an increased use of imitation, memorized social scripts, and social camouflaging (Eaton, 2017; Lai et al., 2017). Autistic girls are expected to meet the higher social standards held for women while navigating the social challenges associated with their diagnosis (Saxe, 2017). The more common use of social camouflaging among autistic girls and women may be due to a higher level of experienced stigmatization because of their marginalized gender identity along with their diagnosis (Cage & Troxell-Witman, 2019). Social camouflaging is a tactic used to improve social functioning that has serious impacts on mental health, including exhaustion, loss of identity, anxiety, depression, and suicidality (Lai & Szatmari, 2020). Further, social camouflaging tends to become progressively less effective for girls throughout adolescence, and difficulties in social competence become more noticeable in autistic girls throughout development, as social expectations rise and interpersonal relationships become more complicated (Lai et al., 2017). It has been suggested that autistic girls may experience more psychological distress when they are unable to form and maintain positive peer relationships compared to autistic boys, due to higher levels of social motivation (Lundin et al., 2021). However, more research is needed to better understand the relations between gender, social motivation, and mental health factors in autistic youth.

One limitation of the current literature on the mental health and social experiences of autistic individuals is the lack of information gathered on the experience

of gender diverse individuals. The majority of the existing autism literature focuses on the experience of male autistic individuals and conceptualizes gender as a binary; however, a subset of previous research studies have included non-binary and non-cisgender participants. For example, Sedgewick et al., (2019) found that women, non-binary, and transgender autistic participants were more anxious than male autistic participants. Further, Hull et al. (2020) found that female autistic participants social camouflaged more often than male autistic participants, and that non-binary autistic participants social camouflaged more often than both female and male autistic participants.

Although autistic girls appear to be more socially skilled than autistic boys, these differences may be superficial and could instead reflect gender differences in social motivation (Lai et al., 2017). Socially motivated autistic girls are especially likely to engage in social camouflaging to appear neurotypical, which may lead to internalizing problems (Lai & Szatmari, 2020). The high prevalence of internalizing symptoms experienced by autistic girls may be because both their diagnosis and gender identities are associated with an increased risk of internalizing problems (Solomon et al., 2012).

1.3.2. Age Differences in Internalizing Symptoms and Social Motivation

The relations between internalizing symptoms and social motivation in autistic youth may vary across development. The prevalence of internalizing disorders in autistic youth increases throughout middle childhood and adolescence (Pezzimenti et al., 2019). Similarly, difficulties in interpersonal relationships also often emerge around middle childhood and become more evident throughout adolescence (Eaton, 2017). Autistic girls frequently use social camouflaging in an attempt to smooth social interactions, which may indicate a high level of social motivation (Eaton, 2017; Livingston et al., 2019). However, adolescent girl relationships become increasingly complex throughout adolescence and social camouflaging becomes less effective in meeting this increased demand (Eaton, 2017). Lower levels of social motivation have been associated with more social difficulties (Neuhaus et al., 2021) and it has been proposed that negative peer interactions may also lower the social motivation of autistic individuals over time (Spain et al., 2018). Additionally, negative peer interactions have also been associated with increases in internalizing symptoms (Eaton, 2017; Christina et al., 2021). Together,

these findings may indicate that the relations between social motivation and internalizing symptoms may become more evident throughout childhood and adolescence.

1.4. Current Study

The aim of the current study is to examine gender and age differences in internalizing symptoms and social motivation among autistic and non-autistic youth. Differences in social motivation across gender and diagnosis are of interest, as existing research suggests variation in social motivation across autistic and non-autistic individuals, as well as between girls and boys. Specifically, non-autistic individuals have been found to be more socially motivated than autistic individuals (Corbett et al., 2014), and girls have been found to be more socially motivated than boys (Sedgewick et al., 2016). However, additional research is needed to better understand differences in social motivation across intersecting gender and diagnosis identities.

The current study also investigates the relations between internalizing symptoms and social motivation across autistic and non-autistic girls and boys. Previous research has found negative associations between internalizing symptoms and social motivation (Briot et al., 2020; Neuhaus et al., 2019). Youth with heightened anxiety or low mood may be socially withdrawn. Similarly, youth with low social motivation may be more likely to experience social disconnection, leading to internalizing symptoms. However, it has also been suggested that higher social motivation may be associated with greater use of masking strategies, or social camouflaging (Livingston et al., 2019). Social camouflaging is associated with negative mental health outcomes, including elevated internalizing symptoms (Lai & Szatmari, 2020). Therefore, there is also evidence to suggest that higher social motivation may be associated with greater internalizing symptoms in autistic youth.

Consequently, the current study seeks to further explore the relations between internalizing symptoms and social motivation and whether these relations differ with gender and diagnosis. Alongside differences in social motivation across gender and diagnosis, previous research suggests that both girls and autistic individuals experience more internalizing symptoms than boys and non-autistic individuals, respectively (e.g., Solomon et al., 2012). Therefore, the current study aims to examine the relations

between social motivation and internalizing symptoms across both gender and diagnosis.

Age is also of interest, as previous research has identified that the risk for internalizing problems, such as depressive disorders, increases in adolescence for autistic individuals (Lai et al., 2017). Additionally, differences in social competence become increasingly apparent in adolescence, as peer relationships become more complex and intimate (Lai et al., 2017; Wood-Downie et al., 2021).

Overall, this study seeks to further explore the relations between internalizing symptoms and social motivation across genders in autistic and non-autistic youth. It was hypothesized that (1) non-autistic participants would be more socially motivated than autistic participants, (2) autistic and non-autistic girl participants would be more socially motivated than autistic and non-autistic boy participants, respectively, (3) relations between internalizing symptoms and social motivation would differ with diagnosis and gender, and (4) there would be an effect of age in the relations between internalizing symptoms and social motivation.

Chapter 2.

Methods

2.1. Participants

In total, 386 participants were included in the current study, ranging in age from 6.00 to 14.80 years old (M = 9.86, SD = 1.85). Of these participants, 189 are autistic and 197 are non-autistic. Data for this study was collected from parents of children attending day camps hosted by the Autism and Developmental Disabilities Lab (ADDL) at Simon Fraser University. Children who attended these day camps participated in camp activities while their caregivers responded to questionnaires about their children. All participants of the day camp had an English-speaking caregiver who completed the questionnaires. For the participants who attended multiple day camps (n = 113), only data collected during the most recent camp was analyzed. Recruitment for these day camps was done by reaching out to members of the ADDL's mailing list, contacting various autism service providers in the Lower Mainland area, and through posting advertisements to social media. The day camp was free to attend and open to autistic and non-autistic youth. Youth who required one-to-one support attended the day camp with a caregiver or support worker. Caregivers were asked to provide their annual family income and the ethnic or cultural background of their child, as summarized in Table 1.

Table 1

Sample Characteristics (N = 386)

	Frequency
Cultural/Ethnic Background	
East Asian	166
Canadian	138
White	94
Southeast Asian	23
South Asian	18
Latinx	17
Middle Eastern	9
Black	6
Indigenous	5
Other	11
Undisclosed	2
Annual Family Income	
Less than $20,000	12 (3%)
$20-49,999	47 (12%)
$50-79,999	92 (24%)
$80-109,000	65 (17%)
$110-140,000	65 (17%)
Greater than $140,000	58 (15%)
Undisclosed	47 (12%)

Note. Caregivers were asked to provide their child's ethnic or cultural background in an open-response format (see Appendix A), resulting in some responses falling into multiple categories listed above.

2.2. Measures

2.2.1. Gender and Diagnosis

Caregivers of participants completed a demographic form (see Appendix A) which asked them to identify the gender of their child. All participants were identified as either girls (*n* = 133) or boys (*n* = 253). No other gender identities were reported by participants' caregivers. Caregivers of autistic participants confirmed their child's ASD diagnosis through submitting their assessment report or government funding report. The reported mean age of diagnosis was 4.74 years (*SD* = 2.24) for the autistic boys and 5.20 years (*SD* = 2.69) for the autistic girls. In British Columbia, youth autism

assessments must adhere to a number of standards, including the administration of a standardized diagnostic interview with a primary caregiver, such as the Autism Diagnostic Interview-Revised (ADI-R), and a standardized observation of social and communicative behaviour and play, such as the Autism Diagnostic Observation Schedule (ADOS-2; Dua et al., 2003).

2.2.2. Internalizing Symptoms

The second and third editions of the Behaviour Assessment System for Children (BASC; Reynolds & Kamphaus, 2004; 2015) are standardized measures of behavioural and emotional adjustment. The BASC has good to excellent (Hunsley & Mash, 2008) internal consistency (BASC-2: α = .81 - .96; BASC-3: α = .83 - .97) and test-retest reliability (BASC-2: *r* =.77 - .90; BASC-3: *r* =.85 - .93), and adequate interrater reliability (BASC-2: *r* =.70 - .84; BASC-3: *r* =.67 - .82; Reynolds & Kamphaus, 2004; 2015). Caregivers of participants aged 6 to 11 years old completed the Parent Rating Scale for Children (PRS-C) and caregivers of participants 12 years or older completed the Parent Rating Scale for Adolescents (PRS-A) of either the BASC-2 or the BASC-3. The majority of caregivers completed the BASC-2 (93%; *n* = 358). The Parent Rating Scales are comprised of a series of statements answered with a four-point rating scale (never, sometimes, often, almost always).

This study examines participants' *T* scores on the internalizing problems composite, which is comprised of the anxiety (BASC-2 PRS-C = 14 items; BASC-2 PRS-A= 11 items; BASC-3 PRS-C = 14 items, BASC-3 PRS-A = 13 items), depression (BASC-2 PRS-C = 14 items; BASC-2 PRS-A = 14 items; BASC-3 PRS-C = 13 items; BASC-3 PRS-A = 13 items), and somatization (BASC-2 PRS-C = 12 items; BASC-2 PRS-A = 11 items; BASC-3 PRS-C = 12 items; BASC-3 PRS-A = 10 items) scales. The internalizing problems composite includes statements such as "worries about what other children think" and "is easily upset." *T* scores are standardized scores with a mean of 50 and standard deviation of 10. Internalizing problems *T* scores below 60 are classified as "Average," while *T* scores of 60-69 are classified as "At-Risk," and *T* scores falling above 69 are deemed "Clinically Significant."

2.2.3. Social Motivation

The Multidimensional Social Competence Scale (MSCS; Yager & Iarocci, 2013) is a standardized parent-report measure of social competence for autistic children. The MSCS is a questionnaire with 77 items answered using a five-point rating scale (not true or almost never true, rarely true, sometimes true, often true, very true or almost always true). The MSCS measures seven domains of social competence: social motivation, demonstrating empathic concern, nonverbal sending skills, social inference, social knowledge, verbal conversation skills, and emotion regulation. The former three domains fall under the social responsiveness subscale, and the latter four make up the social understanding/emotion regulation subscale.

The psychometric properties of the MSCS were evaluated using a sample of 183 youth (135 autistic, 48 nonautistic) ages 11 to 18 years, without intellectual disability (Yager & Iarocci, 2013). Confirmatory factor analyses supported the multidimensional factor structure of the MSCS. Internal consistency was found to be good to excellent (Hunsley & Mash, 2008) across domains, subscales, and total scores (α = .84 - .95). The MSCS total score demonstrated strong convergent validity (r = -.89) when compared with the total score of the Social Responsiveness Scale (SRS; Constantino & Gruber, 2005), a widely-used measure of social behaviours in autistic youth. Further supporting construct validity, significant correlations were observed between participants' MSCS total scores and their number of friends (r = .69), frequency of social contact (r = .38), and tendency to get along with classmates (r = .56; Yager & Iarocci, 2013).

For the purposes of the current study, participants' MSCS social motivation scores were considered. The social motivation domain measures participants' interest in others and their tendency to initiate social interactions. This domain consists of 11 items that address both the behavioural aspects of social motivation, such as "initiates play with other kids," and the cognitive aspects of social motivation, such as "prefers to spend time alone." Possible social motivation scores range from 1 to 55, with higher scores representing higher levels of social motivation. Yager and Iarocci (2013) found that the Social Motivation domain has good (Hunsley & Mash, 2008) internal consistency (α = .87). The internal consistency of this domain within the current study's sample was found to be excellent (α = .91; Hunsley & Mash, 2008).

2.2.4. Intelligence Quotient

Participants' intelligence quotient (IQ) was measured using the Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II; Wechsler, 2011). The WASI-II is a well-established standardized battery of tests that assess general cognitive abilities. Participants' Full-Scale IQ-2 (FSIQ-2) scores from the WASI-II are examined in the current study. The FSIQ-2 is a composite score, comprised of participants' scores on the Vocabulary and Matrix Reasoning subtests, which are measures of verbal comprehension and fluid reasoning, respectively. FSIQ-2 scores were controlled for in the current study, as previous research has found that IQ is a significant predictor of internalizing symptoms (Mayes et al., 2011; Sterling et al., 2008).

2.3. Procedure

The current study was approved by Simon Fraser University's Office of Research Ethics. The data examined in the current study was collected within a larger ongoing study on social attention and social competence in autistic and non-autistic youth. Prior to their child's attendance at the day camp, caregivers completed an online consent form. Caregivers were then asked to complete the demographics form, BASC-2 or BASC-3, and MSCS either in-person, while their child was engaging in camp activities, or remotely, through the online Qualtrics survey system. During the day camp, participants engaged in a variety of activities, including crafts and games. Participants also completed the WASI-II at various times throughout the camp day. The WASI-II was administered by a trained graduate student of the ADDL and participants provided verbal assent before engaging in this task.

2.4. Data Analytic Strategy

Data analyses for the current study were completed using IBM SPSS Statistics for Macintosh, Version 27.0 (IBM Corp., 2020). Descriptive analyses were performed to calculate the means, standard deviations, and ranges of all variables. Pearson correlation coefficients were calculated to examine associations between age, internalizing symptoms, and social motivation across all participants as well as within gender and diagnosis groups.

To assess whether social motivation varies with diagnosis, an independent samples *t*-test was conducted to observe whether there are differences in means between autistic and non-autistic participants' social motivation scores. Similarly, to assess whether social motivation varies by gender within each diagnostic group, independent samples *t*-tests were conducted to assess whether there are differences in mean social motivation scores between (a) autistic girls and autistic boys, and (b) non-autistic girls and non-autistic boys. To control for multiple comparisons and reduce the likelihood of Type I errors, a Bonferroni correction method was applied to set a family-wise error rate of $\alpha = .05$. Prior to interpreting the results of the independent samples *t*-tests, the assumption of homogeneity of variances was first assessed.

To examine whether the associations between internalizing symptoms and social motivation differs by diagnosis and gender, a series of tests based on the Fisher transformation were conducted. First, correlation coefficients were compared between autistic and non-autistic participants. Next, the omnibus χ^2 test was conducted to test whether the correlations between internalizing problems and social motivation scores were equal across gender and diagnosis groups. Follow up analyses then compared internalizing problems and social motivation score correlations between (1) autistic girls and boys, (2) non-autistic girls and boys, (3) autistic and non-autistic girls, and (4) autistic and non-autistic boys. Prior to analyses, correlation coefficients between internalizing symptoms and social motivation for these groups were transformed using the Fisher transformation (Myers et al., 2010, Equation 19.2, p. 470). The omnibus test based on the χ^2 for independent correlations (Myers et al, 2010, Equation 19.6, p. 476) was next conducted. This omnibus χ^2 test was conducted to test the equality of correlations between internalizing problems and social motivation scores across gender and diagnosis. Next, a series of pairwise comparisons based on the Fisher transformation (Myers et al., 2010, Equation 19.4, p. 474) were conducted as follow up analyses to compare pairs of independent correlations between internalizing problems and social motivation scores across gender and diagnosis. To reduce the risk of Type I errors, a Bonferroni step-down correction method was applied to set a family-wise error rate of $\alpha = .05$ across the four follow-up analyses. The four pairwise comparisons, ordered from smallest to largest *p*-value, were compared to corrected alpha critical values of .013, .017, .025, and .05, respectively.

To further examine the relations between internalizing symptoms and social motivation across gender and diagnosis, a hierarchical regression analysis was conducted with participants' internalizing problems composite scores as the outcome variable. R^2 Change scores were analyzed to determine whether the identified predictors of interest were able to account for a significant amount of variance in the dependent variable, beyond the variance predicted by the control variable entered in the previous Block. Because previous research has established that cognitive ability is associated with internalizing problems (e.g., Sterling et al., 2008), participants' FSIQ-2 (Wechsler, 2011) scores were controlled for in Block 1. Participants' gender (girl or boy), diagnosis (autistic or non-autistic), and centered age were then entered in Block 2. Interactions between these demographic variables were entered in Block 3. Participants' centered social motivation scores were then entered in Block 4. Two-way interaction terms of interest between social motivation and age, gender, and diagnosis were entered in Block 5 and three-way interaction terms combining social motivation with age, gender, and diagnosis were entered in Block 6. Interaction terms of interest were initially entered together in Blocks 5 and 6 to examine their collective contribution to the model, with the intention to examine them separately if they significantly contributed to the model. Subsequently, a second hierarchal regression analysis was also conducted with these interaction terms entered into their own Blocks, to allow for a more detailed exploration of how each interaction term contributed to the model.

Prior to interpreting results from the hierarchical regression analysis, data was first inspected to identify potential outliers and influential cases. Normal probability plots were visually inspected to test the assumption of normality of errors. To test the assumption of homoscedasticity and that the relationship between the outcome variable and predictor variables is linear, a plot of standardized predicted values against standardized residuals was also visually inspected. A Durbin Watson test was conducted to test for autocorrelation. Finally, to test for multicollinearity amongst predictors, variance inflation factors were examined.

Chapter 3.

Results

3.1 Descriptive Statistics

Descriptive statistics for the current study are summarized in Table 2. Composite and subscale scores for the BASC, as well as domain and total scores for the MSCS, are summarized in Appendix E and F, respectively.

Table 2

Descriptive Statistics for Full-Scale IQ, Age, Internalizing Problems, and Social Motivation Across Autistic and Non-Autistic Girls and Boys (N = 386)

		Autistic Participants (n = 189)		Non-Autistic Participants (n = 197)	
Variable	All Participants (N = 386)	Girls (n = 43)	Boys (n = 146)	Girls (n = 90)	Boys (n = 107)
Full-Scale IQ					
M	104.27	102.30	97.83	111.73	107.58
SD	17.78	19.92	19.39	13.19	14.62
Min	45.00	55.00	45.00	79.00	75.00
Max	144.00	144.00	139.00	142.00	142.00
Age					
M	9.86	9.90	10.21	9.59	9.61
SD	1.85	2.10	1.83	1.76	1.78
Min	6.00	6.00	6.09	6.14	6.06
Max	14.80	14.77	13.74	13.40	14.80
Internalizing Problems					
M	54.90	60.83	58.52	49.17	52.38
SD	12.82	14.57	12.89	10.64	11.14
Min	31.00	37.00	36.00	31.00	32.00
Max	103.00	103.00	91.00	81.00	81.00
Social Motivation					
M	34.98	30.56	29.49	40.90	39.28
SD	8.85	6.84	7.40	6.99	7.24
Min	12.00	12.00	12.00	22.00	21.00
Max	54.00	47.00	46.00	54.00	54.00

Note. Full-Scale IQ = Participants' WASI-II FSIQ-2 scores; Age = Participants' age in years at the time of testing; Internalizing Problems = Participants' BASC-2 or BASC-3 Internalizing Problems Composite T-scores; Social Motivation = Participants' MSCS Social Motivation Domain scores.

Regarding gender, of the 189 autistic participants, 43 were girls and 146 were boys. Boys are around three to four times more often diagnosed with ASD than girls (APA, 2022); therefore, the fewer autistic girls than autistic boys in the current sample may be similar to the ratio of boys to girls with diagnosed autism in the larger population. For the 197 non-autistic participants, 90 were girls, and 107 were boys. Gender was found to be evenly distributed across non-autistic participants, χ^2 (1, N = 197) = 1.47, p = .226.

Of note, 16 participants (3 autistic girls, 13 autistic boys) had a WASI-II FSIQ-2 score of less than 70, which is indicative of intellectual disability. To assess the potential influence of these participants' scores on the results, correlation and regression analyses were conducted separately with these children excluded. These analyses found no significant differences and therefore these participants were retained in the final analyses.

The majority of participants (n = 266, 69%) had BASC-2 or BASC-3 internalizing problems composite scores that fell within the Average range. However, overall, 67 participants scored in the At-Risk range and 53 participants scored in the Clinically Significant range of the internalizing problems composite. More specifically, approximately 19% of the autistic girls (n = 8), 23% of the autistic boys (n = 33), 12% of the non-autistic girls (n = 11), and 14% of the non-autistic boys (n = 15) scored in the At-Risk range. Comparatively, approximately 28% of the autistic girls (n = 12), 18% of the autistic boys (n = 26), 4% of the non-autistic girls (n = 4), and 10% of the non-autistic boys (n = 11) scored in the Clinically Significant range of the internalizing problems composite.

3.1.1. Independent Samples T-Tests

To test the hypotheses regarding group differences in social motivation, three independent samples t-tests were conducted. Specifically, these t-tests compared social motivation scores between non-autistic and autistic participants, as well as between girls and boys within each diagnosis group. Social motivation scores were normally distributed within each group, as assessed by Shapiro-Wilk's test (p > .05). The assumption of homogeneity of variances was also met for each test, as assessed by

Levene's test for equality of variances ($p > .05$). The results of the independent samples *t*-test are summarized in Table 3.

Table 3

Independent Sample T-Tests on Social Motivation Score Means Between Groups

Group	*M*	*SD*	*df*	*t*	*p*	Cohen's *d*
Autistic and Non-Autistic Participants			384	14.02	<.001	1.43
Autistic Participants	29.73	7.27				
Non-Autistic Participants	40.02	7.15				
Autistic Girls and Boys			187	-.85	.40	-.15
Autistic Girls	30.56	6.84				
Autistic Boys	29.49	7.40				
Non-autistic Girls and Boys			195	-1.59	.11	-.23
Non-autistic Girls	40.90	6.99				
Non-autistic Boys	39.28	7.23				

In support of the hypothesis that non-autistic participants would be more socially motivated than autistic participants, the mean social motivation score for autistic participants ($M = 29.73$) was significantly lower than the mean social motivation score for non-autistic participants ($M = 40.02$), $t\ (384) = 14.02$, $p < .001$.

Contrary to the hypothesis that girls would be more socially motivated than boys within diagnosis groups, it was found that there was no difference in mean social motivation scores between autistic girls and boys, $t\ (187) = -.85$, $p = .397$. Similarly, there was no difference in mean social motivation scores between non-autistic girls and boys, $t\ (195) = -1.59$, $p = .114$.

3.2. Correlation Analyses

Pearson correlations between internalizing problems, social motivation, and age for all participants and for autistic and non-autistic participants separately are summarized in Table 4.

Table 4

Correlations Among Age, Internalizing Problems, and Social Motivation Across Autistic and Non-Autistic Participants (N = 386)

	All Participants (*N* = 386)		Autistic Participants (*n* = 189)		Non-Autistic Participants (*n* = 197)	
Variable	IP	SM	IP	SM	IP	SM
Age	.13*	-.20**	.07	-.13	.11	-.15*
IP		-.34**		-.09		-.33**

Note. Age = Participants' age in years at the time of testing; IP = Participants' BASC-2 or BASC-3 Internalizing Problems Composite scores; SM = Participants' MSCS Social Motivation Domain scores.
** p < .05; ** p < .001.*

Correlations between internalizing problems, social motivation, and age were also examined by gender within both participant groups, as summarized in Table 5.

Table 5

Correlations Among Age, Internalizing Problems, and Social Motivation Across Gender and Diagnosis Groups (N = 386)

	Autistic Participants (*n* = 189)				Non-Autistic Participants (*n* = 197)			
	Girls (*n* = 43)		Boys (*n* = 146)		Girls (*n* = 90)		Boys (*n* = 107)	
Variable	IP	SM	IP	SM	IP	SM	IP	SM
Age	.04	-.14	.09	-.13	.11	-.22*	.10	-.10
IP		-.50**		.02		-.36**		-.28*

Note. Age = Participants' age in years at the time of testing; IP = Participants' BASC-2 or BASC-3 Internalizing Problems Composite scores; SM = Participants' MSCS Social Motivation Domain scores.
** p < .05; ** p < .001.*

Across all participants, there was a significant small positive correlation between age and internalizing problems, such that older participants had more internalizing symptoms than younger participants, r (384) = .13, p = .014. In contrast, correlations between age and internalizing problems within each gender and diagnosis group were found to be insignificant. A significant negative correlation was found between age and social motivation across all participants, such that older participants had lower social motivation than younger participants overall, r (384) = -.20, p < .001. However, when examining the correlations between age and social motivation within each gender and diagnosis group, a significant relation was only found amongst non-autistic girls, r (88) = -.22, p = .038.

Results revealed that while there was a significant negative correlation between internalizing problems and social motivation among non-autistic participants (r (195) = -

.33, $p < .001$), this correlation was not significant among autistic participants (r (187) = -.09, p = .207). However, when examining the relations between internalizing problems and social motivation within each gender and diagnosis group, a significant, large negative correlation was found between internalizing problems and social motivation scores in autistic girls, r (41) = -.50, $p > .001$. Similarly, negative correlations between internalizing problems and social motivation were observed in both non-autistic girls (r (88) = -.36, $p > .001$) and non-autistic boys (r (105) = -.28, $p > .004$). However, internalizing problems and social motivation scores were not correlated among autistic boys, r (144) = .02, p = .78.

3.2.1. Between-Group Correlation Comparisons

A series of tests based on the Fisher transformation were conducted to compare correlations between internalizing problems and social motivation scores across groups. First, correlations between internalizing problems and social motivation were compared between autistic and non-autistic participants. Internalizing problems and social motivation scores were found to be more closely associated across non-autistic participants (r (195) = -.33) compared to autistic participants (r (187) = -.09), z = 2.39, p = .016.

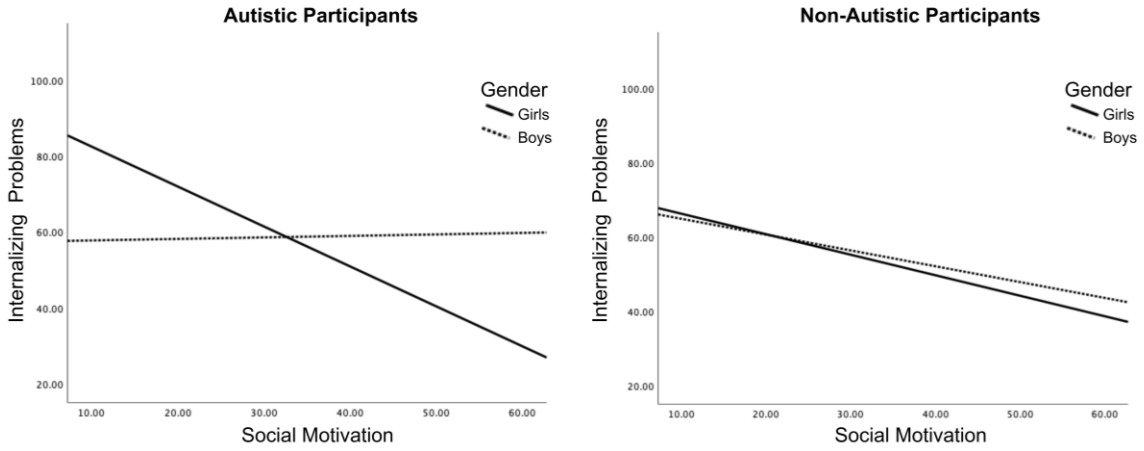
To further examine the differences in associations between internalizing problems and social motivation scores, the omnibus χ^2 test was conducted to examine whether these correlations varied based on gender and diagnosis together. The results of this test found that the correlations between internalizing problems and social motivation were not equal across autistic and non-autistic girls and boys, χ^2 (3, N = 386) = 11.63, $p < .01$.

Follow-up pairwise comparisons were conducted to identify which gender and diagnosis groups presented with unequal correlations between internalizing symptoms and social motivation. To adjust for multiple comparisons and control for Type I error, a Bonferroni step-down correction method was used to adjust the set family-wise error rate of $\alpha = .05$ across the four follow-up analyses, such that the four comparisons, ordered from smallest to largest p-value, were compared to corrected alpha critical values of .013, .017, .025, and .05, respectively. The correlation between participants' internalizing problems and social motivation scores was significantly stronger in autistic girls (r (41) =

-.50) compared to autistic boys (r (144) = .02), z = -3.17, p = .002. In contrast, the correlation between internalizing problems and social motivation scores did not differ significantly between non-autistic girl (r (88) = -.36) and non-autistic boy (r (105) = -.28) participants, z = -.67, p =.503. Similarly, there was no significant difference in correlations between internalizing problems and social motivation scores between autistic girls and non-autistic girls, z = -.86, p = .390. However, the correlations between internalizing problems and social motivation scores were significantly stronger among non-autistic boys compared to autistic boys, z = 2.40, p = .016. Correlations between internalizing problems and social motivation scores within each gender and diagnosis group are plotted in Figure 1.

Figure 1

Correlations Between Internalizing Problems and Social Motivation Scores by Gender and Diagnosis



Note. Internalizing problems = Participants' BASC-2 or BASC-3 Internalizing Problems Composite scores; Social motivation = Participants' MSCS Social Motivation Domain scores.

3.3. Hierarchical Regression Analyses

To further examine the relations between age, gender, social motivation, and internalizing symptoms across autistic and non-autistic youth, a hierarchical regression analysis was conducted. Prior to running the hierarchical regression analysis, relevant assumptions were assessed. No outliers or influential cases were detected through examining studentized residuals and Cook's Distance scores. The assumption of linearity and homoscedasticity was met, as visually assessed by a plot of standardized predicted values against standardized residuals. A Normal Probability Plot was

inspected, and it was found that the assumption of normality of errors was also met. Additionally, the assumption of independence of errors was supported, as indicated by a Durbin-Watson score of 2.13. Finally, variance inflation factors were observed for each predictor and were found to fall below the cut-off of 5, indicating a lack of multicollinearity.

Using G*Power (Faul et al., 2007), a power analysis was conducted and found that based on a sample size of 386, alpha level of .05, 14 tested predictors, and assuming a moderate effect size (f^2 = .15), the hierarchical regression analysis had significant statistical power, with a power estimate of .99. The minimum changes in R^2 required at each Block to be deemed statistically significant were calculated and ranged from .010 - .025.

For the hierarchal regression analysis, participants' internalizing problems composite scores were set as the outcome variable. Participants' WASI-II FSIQ-2 scores were controlled for in Block 1 and did not account for a significant portion of variance in internalizing problems, $R^2 < .01$, F (1, 384) = .02, p = .884. Participants' gender, diagnosis, and centered age were next entered in Block 2 and accounted for a significant additional 11.8% of the variance in internalizing problems scores, F (3, 381) = 17.03, $p < .001$. Of these three variables, diagnosis was found to be a significant predictor of internalizing problems scores (β = .33, $p < .001$). Interactions between the demographic variables entered in Block 2 were then entered in Block 3 and did not significantly contribute to the model, ΔR^2= .010, F (4, 377) = 1.11, p = .350.

Centered social motivation scores were entered in Block 4 and accounted for a significant additional 3.1% of the variance in internalizing problems scores, F (1, 376) = 14.06, $p < .001$. Higher social motivation scores predicted lower internalizing problems scores (β = .09, $p < .001$). Two-way interaction terms between social motivation and gender, diagnosis, and age were entered in Block 5, and accounted for a significant additional 2.6% of the variance in internalizing problems scores, F (3, 373) = 4.00, p = .008. Finally, three-way interactions terms between social motivation and gender, diagnosis, and age were entered in Block 5 and accounted for an additional 1.9% of the variance in internalizing problems scores, F (3, 370) = 3.00, p = .031. This initial hierarchical regression analysis is summarized in Table 6.

Table 6

Hierarchical Regression Analysis Predicting Internalizing Problems from Gender, Diagnosis, Age, and Social Motivation (N =386)

	B	β	ΔR^2	ΔF	*df*
Step 1			<.01	.021	1, 384
IQ	.01	.01			
Step 2			.12	17.03**	3, 381
Gender	-1.25	-.05			
Diagnosis	8.44	.33**			
Age	.43	.06			
Step 3			.01	1.11	4, 377
Gender*Diagnosis	5.67	.14*			
Gender*Age	.08	.98			
Diagnosis*Age	.13	.86			
Gender*Diagnosis*Age	-.48	-.03			
Step 4			.03	14.06**	1, 376
Social Motivation	-.32	.09**			
Step 5			.03	4.00*	3, 373
Social Motivation*Gender	-.51	-.20*			
Social Motivation*Diagnosis	.23	.18			
Social Motivation*Age	-.05	-.07			
Step 6			.02	3.00*	3, 370
Social Motivation*Gender*Diagnosis	-1.20	-.21*			
Social Motivation*Age*Diagnosis	-.08	-.08			
Social Motivation*Gender*Age	.12	.09			

Note. Gender is coded as follows: 0 = Boys, 1 = Girls; Diagnosis is coded as follows: 0 = Non-autistic participants, 1 = Autistic participants; IQ = Participants' WASI-II FSIQ-2 scores; Age = Participants' age in years at the time of testing; Social Motivation = Participants' centered MSCS Social Motivation Domain scores.
** p < .05; ** p < .001.*

To further examine how the interaction terms entered in Block 4 and Block 5 contributed to the model, a second hierarchical regression analysis was run with these interaction terms separated into their own Blocks. The two-way interactions between social motivation and gender, diagnosis, and age were entered in Blocks 5, 6, and 7, respectively. Of these interaction terms, only the interaction between social motivation scores and gender was found to account for a significant portion of variance in internalizing problems scores. This interaction term accounted for an additional 2% of the variance in internalizing problems scores above and beyond the variance accounted for by the variables entered in the previous Blocks, F (1, 375) = 1.46, p = .003. This indicates that the relations between social motivation and internalizing symptoms vary

with gender, such that social motivation was a stronger predictor of internalizing problems across girl participants, compared to boy participants (β = -.22, p = .003).

Next, three-way interaction terms between social motivation and gender, diagnosis, and age were entered in Blocks 8, 9, and 10. Of these interaction terms, the interaction between social motivation, gender, and diagnosis was found to significantly contribute to the model. This interaction term accounted for an additional 1% of the variance in internalizing problems scores, F (1, 372) = 6.25, p = .013. This significant three-way interaction indicates that the relations between social motivation and internalizing symptoms differ with both gender and diagnosis together, such that the effect of social motivation on internalizing problems was stronger for girls, particularly amongst the autistic participants (β = -.20, p = .013). These findings support the hypothesis that the relations between social motivation and internalizing symptoms vary with diagnosis and gender. In contrast, the results of the hierarchical regression analysis do not support the hypothesis that the relations between internalizing symptoms and social motivation differ with age, as the two and three-way interactions involving participant age did not contribute significantly to the model.

Overall, the entire hierarchical regression model, including all predictor variables, accounted for approximately 20.6% of the variance in internalizing problems. The second hierarchical regression analysis with social motivation interaction terms entered separately is summarized in Table 7.

Table 7

Hierarchical Regression Analysis Predicting Internalizing Problems from Gender, Diagnosis, Age, and Social Motivation with Social Motivation Interaction Terms Examined Independently (N =386)

	B	β	ΔR^2	ΔF	*df*
Step 1			<.01	.021	1, 384
IQ	.01	.01			
Step 2			.12	17.03**	3, 381
Gender	-1.25	-.05			
Diagnosis	8.44	.33**			
Age	.43	.06			
Step 3			.01	1.11	4, 377
Gender*Diagnosis	5.67	.14*			
Gender*Age	.08	.98			
Diagnosis*Age	.13	.86			
Gender*Diagnosis*Age	-.48	-.03			
Step 4			.03	14.06**	1, 376
Social Motivation	-.32	.09**			
Step 5			.02	9.21*	1, 375
Social Motivation*Gender	-.55	-.22*			
Step 6			<.01	1.46	1, 374
Social Motivation*Diagnosis	.21	.09			
Step 7			<.01	1.32	1, 373
Social Motivation*Age	-.05	.04			
Step 8			.01	6.25*	1, 372
Social Motivation*Gender*Diagnosis	-.96	-.20*			
Step 9			<.01	1.26	1, 371
Social Motivation*Age*Diagnosis	-.10	-.10			
Step 10			<.01	1.49	1, 370
Social Motivation*Gender*Age	.12	.09			

Note. Gender is coded as follows: 0 = Boys, 1 = Girls; Diagnosis is coded as follows: 0 = Non-autistic participants, 1 = Autistic participants; IQ = Participants' WASI-II FSIQ-2 scores; Age = Participants' age in years at the time of testing; Social Motivation = Participants' centered MSCS Social Motivation Domain scores.
** p < .05; ** p < .001.*

Chapter 4.

Discussion

The purpose of the current study was to investigate the relations between internalizing symptoms, social motivation, gender, and age among a group of autistic and non-autistic youth. Specifically, the current study tested four hypotheses: (1) non-autistic youth are more socially motivated than autistic youth, (2) autistic and non-autistic girls are more socially motivated than autistic and non-autistic boys, respectively, (3) the relations between internalizing symptoms and social motivation differ with gender and diagnosis, and (4) age has an impact on the relations between internalizing symptoms and social motivation.

In the following, the findings of the current study are interpreted and compared with the existing literature on internalizing symptoms and social motivation in autistic and non-autistic youth. Next, the theoretical and social implications of these findings are explored. Lastly, the limitations of the current study are described and possible directions for future research are suggested.

4.1. Social Motivation

4.1.1. Differences in Social Motivation Between Autistic and Non-Autistic Youth

As hypothesized, non-autistic participants had significantly higher social motivation scores than autistic participants. This finding that non-autistic participants were more socially motivated than non-autistic participants is consistent with previous research (Corbett et al., 2014). Of note, a range of social motivation scores was observed among both autistic and non-autistic participants. Therefore, while autistic participants exhibited lower social motivation scores compared to non-autistic participants on average, interindividual variability in social motivation was observed within both groups. This supports the notion that autistic youth, similar to non-autistic youth, present with variation in levels of social motivation (Jaswal & Akhtar, 2019; Mundy, 2019). These findings do not support the claim that low social motivation is common across autistic individuals (Chevallier et al., 2012). It is important to note that

how autistic youth relate to, and interact with, others often differs from the neurotypical norm, and these differences do not necessarily indicate low social motivation (Kapp et al., 2019).

4.1.2. Gender Differences in Social Motivation

Comparing social motivation scores across diagnosis and gender together was also of interest. The current study's findings did not support the hypothesis that autistic and non-autistic girls are more socially motivated than autistic and non-autistic boys, respectively, as no significant differences in social motivation scores were found between girls and boys in either group.

The existing literature on gender differences in social motivation amongst autistic individuals is limited. However, one study found that autistic girl adolescents, ages 12 to 16 years old, were more socially motivated than autistic boy adolescent participants when comparing scores from a teacher-report questionnaire (Sedgewick et al., 2016). Similarly, another study found that professionals, such as psychologists and physicians, reported observing higher social motivation among autistic female clients compared to autistic male clients (Lundin et al., 2021). It has also been proposed that the more frequent use of social camouflaging strategies by autistic girls and women, compared to autistic boys and men, may reflect a higher level of social motivation (Livingston et al., 2019; Mitchell et al., 2021). Additionally, there are also cultural and social expectations surrounding girls being more relationally oriented and socially motivated compared to boys (Saxe, 2017).

Taken together, the limited existing literature on gender differences in the social motivation of autistic individuals suggests that autistic girls may be more socially motivated than autistic boys. However, the findings of the current study did not reveal any significant gender differences in social motivation among autistic or non-autistic youth. In interpreting these findings, it is important to consider the specific sample and measures used in the current study. For example, it should be acknowledged that the current study relied on parent-reported social motivation scores and that data for this study was collected within a day-camp setting, which was somewhat social in nature. Parents may provide a more accurate report of their child's social motivation, compared to teachers and service providers, as youth may be less likely to engage in social

camouflaging at home compared to at school or when accessing services in the community. It is also possible that youth with lower social motivation may have been less likely to attend such a day-camp and this may have influenced the observed results. More research is required to better understand the relations between gender and social motivation among autistic and non-autistic youth.

4.2. Relations Between Internalizing Symptoms and Social Motivation

The findings of the current study indicate that approximately 42% of the autistic participants and 21% of the non-autistic participants had internalizing problems scores at or above the At-Risk cut-off. Participant diagnosis was found to account for a significant portion of variance in internalizing problems scores. Social motivation was also found to be a significant predictor of internalizing problems. More specifically, higher social motivation scores were found to predict lower internalizing problems scores. This found negative association between internalizing symptoms and social motivation is consistent with previous research. For example, previous research has found social motivation to be negatively associated with social anxiety in autistic youth (Briot et al., 2020; Swain et al., 2015). Similarly, negative associations were previously observed between social motivation and anxiety as well as depressive symptoms in autistic children and adolescents (Neuhaus et al., 2019).

Youth with internalizing problems, such as anxiety and depression, may be less motivated to engage in social interactions, and similarly, youth with low social motivation may be more likely to experience social disconnection, which may lead to internalizing symptoms (Bellini, 2004). Therefore, the relations between internalizing symptoms and social motivation may be reciprocal. It is also possible that a third variable, such as negative peer interactions, may impact both internalizing symptoms and social motivation. For example, autistic youth are at a higher risk of experiencing peer rejection and this may negatively impact both social motivation and mental wellbeing (Bauminger-Zviely & Kimhi, 2017). Relatedly, social motivation has also been found to be a significant predictor of social skill in autistic youth, particularly amongst youth with few internalizing symptoms, and therefore may influence social success (Neuhaus et al., 2019). Research examining longitudinal relations between social motivation and internalizing symptoms is needed.

4.2.1. Gender Differences

The prevalence of internalizing symptoms has previously been found to vary between autistic and non-autistic youth, as well as between girls and boys (Solomon et al., 2012). Similarly, expectations surrounding social style also vary between autistic and non-autistic youth and by gender (Saxe, 2017). For example, there are social stereotypes about girls and non-autistic individuals being more empathic, warm, and desiring of close relationships compared to boys and autistic individuals, respectively (Saxe, 2017). Therefore, whereas previous research has found significant relations between social motivation and internalizing symptoms (e.g., Briot et al., 2020; Neuhaus et al., 2019), exploring gender differences in these relations among autistic and non-autistic youth was of particular interest in the current study.

As hypothesized, relations between internalizing symptoms and social motivation were found to vary by gender and diagnosis. Findings from the current study indicate that internalizing symptoms and social motivation are more closely associated among autistic girls compared to autistic boys, and among non-autistic boys compared to autistic boys. However, the associations between internalizing symptoms and social motivation were found to be similar between autistic and non-autistic girls, as well as between non-autistic girls and boys. Specifically, more internalizing symptoms were associated with lower social motivation among autistic and non-autistic girls as well as non-autistic boys, while no association was found between internalizing symptoms and social motivation amongst autistic boys.

Interestingly, a significant interaction effect was found between social motivation, gender, and diagnosis that predicted internalizing symptoms above and beyond what was predicted by IQ, age, gender, diagnosis, social motivation, and the interaction between social motivation and gender. The effect of social motivation on internalizing symptoms was found to vary with both gender and diagnosis, such that social motivation was a stronger predictor of internalizing symptoms for girls, specifically among autistic participants. Across participants, the effect of social motivation on internalizing symptoms was stronger amongst girls than boys. However, when also considering diagnosis, this gender difference only remained within the autistic group and not the non-autistic group. In other words, associations between internalizing symptoms and social motivation were similar amongst non-autistic girls and boys, however, were significantly

stronger among autistic girls compared to autistic boys. Autistic girls exhibited a strong negative association between internalizing symptoms and social motivation while internalizing symptoms and social motivation were unrelated among autistic boys.

The differences in relations between internalizing symptoms and social motivation in autistic girls compared to autistic boys may be best understood by considering the unique social expectations associated with the intersecting gender and neurodivergent identities of autistic girls. Autistic girls must navigate the conflicting social stereotypes held about their gender and neurodivergent identities. It has been proposed that social difficulties may have a greater negative impact on the mental health of autistic girls compared to autistic boys (Lundin, 2021). This may be due to the higher social expectations held for girls compared to boys. The friendships of girls are often more complex and intimate compared to boys, and autistic girls often face peer rejection (Lai et al., 2017). Therefore, the stronger association between internalizing symptoms and social motivation among autistic girls compared to autistic boys may reflect higher social expectations alongside a greater importance assigned to social motivation. Overall, the gender differences in relations between internalizing symptoms and social motivation found in the current study highlight the importance of considering the unique social experiences of autistic girls and how these experiences may relate to their mental wellbeing.

4.2.2. Age Differences

Across all participants, age was found to be positively associated with internalizing symptoms and negatively associated with social motivation, such that younger participants had fewer internalizing symptoms and higher social motivation. These findings align with previous research indicating that both internalizing symptoms and difficulties with social competence tend to become more prevalent during middle childhood and adolescence (Lai et al., 2017; Wood-Downie et al., 2021).

However, the current study did not find an effect of age on the relations between internalizing symptoms and social motivation. Previous research suggests that negative peer interactions may decrease social motivation and negatively impact mental wellbeing over time (Eaton, 2017; Christina et al., 2021; Spain et al., 2018), while positive peer interactions may have a positive impact on mental wellbeing and bolster

social motivation (Sedgewick et al., 2019; Spain et al., 2018). Together, the existing literature suggests that the relations between internalizing symptoms and social motivation may become more pronounced across childhood and adolescence; however, this was not observed in the current study.

It is important to consider the restricted age range in the current sample, as participants ranged in age from 6 to 14 years old, with the majority of participants falling between 8 and 11 years old. It is possible that differences in relations between internalizing symptoms and social motivation may become more evident in later adolescence, as internalizing problems become more common and social relationships become more complex. Further, the increased complexity of social relationships in adolescence can surpass compensatory strategies, such as social camouflaging, causing differences in social competence to become more noticeable (Lai et al., 2017). Therefore, more research examining relations between internalizing symptoms and social motivation in older youth may be particularly relevant to understanding the experiences of autistic girls. Research that includes participants with a wider age range, including older adolescents, is necessary to obtain a more comprehensive understanding of the potential effects of age on relations between internalizing symptoms and social motivation.

4.3. Implications

The current study contributes to our understanding of the relations between internalizing symptoms, social motivation, gender, and age in autistic and non-autistic youth. Better understanding the social experiences and mental wellbeing of autistic youth is relevant, as autistic individuals are at an increased risk of experiencing mental health problems and social exclusion (APA, 2022; Saxe, 2017). The social difficulties faced by autistic individuals can contribute to feelings of social alienation and depression (Saxe, 2017). Further, autistic individuals have reported feeling social pressure to change to better fit in, prevent discrimination, and to gain education or employment (Hull et al., 2017).

Findings from the current study highlight the presence of diversity in social motivation among autistic youth. Despite lower social motivation in autistic compared to non-autistic participants overall, it is important to recognize the variability in social

motivation scores observed across both autistic and non-autistic participants. This range of social motivation argues against social motivation being uniformly diminished across autistic individuals and is inconsistent with the notion that low social motivation is a fundamental characteristic of autism. Further, the observed variability in social motivation scores aligns with the testimonies provided by autistic individuals contesting social-deficit models of autism (Jaswal & Akhtar, 2019). Recognizing the variability in social motivation within autistic youth may undermine social-deficit models of autism and encourage critical examination of the social environment and the external barriers experienced by autistic individuals.

The gender differences observed in relations between internalizing symptoms and social motivation in the current study emphasize the importance of including participants with different gender identities in autism research. Girls and women are underrepresented in autism research and the current conceptualization of autism may not account for known gendered differences in social strengths, friendship characteristics, and emotionality (Head et al., 2014). Further, common measures used in autism research may not be sensitive to the higher social attention, verbal abilities, and social camouflaging of autistic girls (Lai & Szatmari, 2020). A more comprehensive understanding of the relations between internalizing symptoms and social motivation was gained in the current study when participants' gender and neurodivergent identities were considered together. Therefore, collapsing across gender when comparing the social experiences or mental health outcomes of autistic youth to non-autistic youth may limit the accuracy of research findings. More broadly, the findings of the current study underscore the value of considering the multiple intersecting identities of autistic individuals in research.

The connections between internalizing symptoms and social motivation found in the current study may provide support for adopting an individualized and integrated approach in providing services for autistic youth. More specifically, services for autistic girls may benefit from focusing on both their social experiences and internalizing symptoms together, rather than in isolation. Additionally, the strong association found between internalizing symptoms and social motivation among autistic girls highlights the importance of gaining a better understanding of their social experiences and addressing the existing social barriers faced by autistic youth. More research on gender differences in the social experiences and mental health outcomes of autistic youth could benefit and

inform the development of future services, particularly those aimed at addressing the unique needs of autistic girls.

4.4. Limitations

The current study has a number of limitations. Firstly, the generalizability of the findings is limited by the sample examined. Participants were recruited for this study through advertisements for a free day-camp for autistic and non-autistic youth hosted at a research lab in a university. Therefore, the current study used a community sample which may not be representative of the larger population. All participants were able and interested in attending this day camp, potentially leading to a biased sample. Additionally, the sample was limited to English-speaking individuals located in the same general geographic area.

It is also important to acknowledge that although the current study had a focus on internalizing symptoms, a non-clinical sample was examined. The majority of participants presented with internalizing symptoms that fell within the average range. Therefore, the current sample does not represent the full range of internalizing problems experienced by autistic and non-autistic youth. The current study's findings on the relations between age, internalizing symptoms, and social motivation were also limited by the restricted age range of the current sample, which did not include any older adolescent participants.

The current study examined gender differences in social motivation and internalizing symptoms while only considering the experiences of girls and boys. Although there are previous research studies which have included non-binary participants (e.g., Sedgewick et al., 2020), the majority of the existing autism literature does not address the experiences of gender diverse individuals. Further, the smaller group size of autistic girls, in comparison to the other gender and diagnosis group sizes, may have also limited the generalizability of the gender-related findings in the current study.

There are also limitations posed by the measures used in the current study. The BASC (Reynolds & Kamphaus, 2004; 2015) was not designed for use with autistic youth, which may impact the accuracy of the internalizing problems scores for the autistic

participants. For example, previous research (e.g., Kerns et al., 2020) has found that mental health measures that are not tailored for use with autistic children may underestimate symptoms. Additionally, the majority of items within the social motivation domain of the MSCS (Yager & Iarocci, 2013) focus on observable, behavioural indicators of social motivation. However, it is likely that a subset of youth desire social connection, yet avoid social interactions due to internalizing problems, such as social anxiety (Swain et al., 2015), and the experiences of these individuals may not be accurately captured in the current study. Relatedly, another limitation of the current study is its reliance on parent-report data. Although self-report measures can be challenging for children, parent reports of their child's thought processes, motivation, and internalizing symptoms may also be inaccurate. Parent report measures have been found to align with youth self-report measures in some autism research (Tipton-Fisler et al., 2018). However, others (e.g., Head et al., 2014) note that self and parent-report measures in autism research vary. Because there are both advantages and disadvantages to parent-report and self-report measures in autism child research, a study design utilizing a variety of informants may best ensure accuracy.

Finally, the cross-sectional nature of the current study prevents examination of the directionality or causation of relationships between variables. Longitudinal data would be needed to identify whether factors such as internalizing symptoms predict later social motivation, or vice versa. It has been suggested that the relations between mental wellbeing and social competence may be reciprocal (Johnston & Iarocci, 2017), however, the current study design does not allow further exploration into this. Additionally, a longitudinal design would be more suitable for examining the course of relationships between internalizing symptoms and social motivation across development, as opposed to comparing participants of different ages. Such a design would allow for the examination of changes and patterns over time, providing a more comprehensive understanding of the developmental trajectory and potential bidirectional influences between internalizing symptoms and social motivation.

4.5. Future Directions

More research is required to better understand the relations between internalizing symptoms, social motivation, gender, and age among autistic youth. Firstly, as the current sample was comprised of participants that identified as girls or boys,

future research examining gender differences in internalizing symptoms and social motivation would benefit from including participants with a wider array of gender identities. Future research would benefit from also considering the effect of additional intersecting identities on relations between internalizing symptoms and social motivation. For example, the relations between internalizing symptoms and social motivation in autistic individuals may be compared across different cultures to examine the role of differing social stereotypes and gender norms. Examining the relations between social motivation and internalizing problems across a wider range of ages is another important avenue for future research. For example, exploring the experiences of participants in later adolescence would offer insights into potential developmental changes in the associations between internalizing symptoms and social motivation.

Future research would also benefit from further examining predictors of social motivation in autistic boys specifically. Although autistic girls and boys exhibited similar levels of social motivation in the current study, the relations between social motivation and internalizing symptoms differed between these groups. The findings highlighted a strong connection between social motivation and internalizing symptoms in autistic girls; however, they do not offer much insight into the factors that may influence social motivation in autistic boys.

Utilizing multiple informants would prove important in better understanding relations between autistic youths' social experiences and mental health. Incorporating perspectives from autistic individuals themselves, as well as family members, service-providers, and peers could provide a more comprehensive and accurate understanding of relations between internalizing symptoms and social motivation. Furthermore, complementing quantitative measures with qualitative methodologies and self-report measures would provide valuable information and contribute to a more nuanced account of the experiences of autistic youth.

Finally, future research could expand upon this study by including other variables that may be of interest in better understanding the social experiences and mental wellbeing of autistic youth. For example, incorporating measures of social camouflaging, strength of friendships, and perceived ableism may prove interesting in better understanding the relations between internalizing symptoms and social

motivation. In particular, examining factors related to the perceived accessibility and inclusiveness of the participants' social environment would be of interest.

4.6. Conclusions

The current study examined relations between internalizing symptoms, social motivation, gender, and age among autistic and non-autistic youth. Consistent with prior research, non-autistic youth exhibited higher levels of social motivation than autistic youth. However, contrary to social-deficit models of autism, a range of social motivation scores were observed across the autistic participants. Unexpectedly, no significant differences in social motivation scores were observed between girls and boys within each participant group. The current study also did not find an effect of age on the relations between internalizing symptoms and social motivation, which may in part be due to the restricted age range of the sample.

Social motivation was found to be a significant predictor of internalizing symptoms, with lower social motivation associated with higher levels of internalizing symptoms. Interestingly, the effect of social motivation on internalizing symptoms was found to vary with both gender and diagnosis, such that social motivation was a stronger predictor of internalizing symptoms for girls among autistic participants. In other words, the associations between internalizing symptoms and social motivation were found to be similar between non-autistic girls and boys, while a stronger relation between social motivation and internalizing symptoms was observed in autistic girls compared to autistic boys. This stronger association between internalizing symptoms and social motivation among autistic girls compared to autistic boys may be attributed to by the unique social experiences and expectations associated with the intersecting gender and neurodivergent identities of autistic girls.

Overall, the current study adds to our understanding of gender differences in relations between internalizing symptoms and social motivation in autistic and non-autistic youth. The findings of the current study underscore the value of adopting an intersectionality perspective by considering both the influence of gender and neurodivergent identities together when investigating the social experiences and mental health of autistic youth. Future research should continue to investigate the relations between internalizing symptoms, social motivation, gender, and age by including

participants with diverse gender identities and broader age ranges, as well as by incorporating the perspectives of additional informants, to better understand the high rates of mental health and social difficulties experienced by autistic youth.

References

American Psychiatric Association. (2022). *Neurodevelopmental disorders*. In Diagnostic and Statistical Manual of Mental Disorders (5th ed. text rev.).

Bauminger-Zviely, N., & Kimhi, Y. (2017). *Friendship in autism spectrum disorder*. In Handbook of Social Skills and Autism Spectrum Disorder (pp. 63-79). Springer, Cham.

Bellini. (2004). Social skill deficits and anxiety in high-functioning adolescents with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, *19*(2), 78–86. https://doi.org/10.1177/10883576040190020201

Botha, M., Hanlon, J., & Williams, G. L. (2021). Does language matter? Identity-first versus person-first language use in autism research: A response to Vivanti. *Journal of Autism and Developmental Disorders*, 1-9.

Bottema-Beutel, K., Kapp, S. K., Lester, J. N., Sasson, N. J., & Hand, B. N. (2021). Avoiding ableist language: Suggestions for autism researchers. *Autism in Adulthood, (3)*1, 19-29. https://doi.org/10.1089/aut.2020.0014.

Briot, Jean, F., Jouni, A., Geoffray, M.-M., Ly-Le Moal, M., Umbricht, D., Chatham, C., Murtagh, L., Delorme, R., Bouvard, M., Leboyer, M., & Amestoy, A. (2020). Social anxiety in children and adolescents with autism spectrum disorders contribute to impairments in social communication and social motivation. *Frontiers in Psychiatry*, *11*, 710–710. https://doi.org/10.3389/fpsyt.2020.00710

Bury, S. M., Jellett, R., Spoor, J. R., & Hedley, D. (2020). “It defines who I am” or “It’s something I have” What language do [autistic] Australian adults [on the autism spectrum] prefer? *Journal of autism and developmental disorders*, 1-11.

Cage, E., & Troxell-Whitman, Z. (2019). Understanding the reasons, contexts and costs of camouflaging for autistic adults. *Journal of Autism and Developmental Disorders, 49*(5), 1899-1911.

Chevallier, C., Kohls, G., Troiani, V., Brodkin, E. S., & Schultz, R. T. (2012). The social motivation theory of autism. *Trends in Cognitive Sciences, 16*(4), 231–239.

Christina, S., Magson, N. R., Kakar, V., & Rapee, R. M. (2021). The bidirectional relationships between peer victimization and internalizing problems in school-aged children: An updated systematic review and meta-analysis. *Clinical Psychology Review*, *85*, 1-19.

Corbett, Swain, D. M., Newsom, C., Wang, L., Song, Y., & Edgerton, D. (2014). Biobehavioral profiles of arousal and social motivation in autism spectrum disorders. *Journal of Child Psychology and Psychiatry*, *55*(8), 924–934. https://doi.org/10.1111/jcpp.12184

Dua, V. (2003). *Standards and Guidelines for the Assessment and Diagnosis of Young Children with Autism Spectrum Disorder in British Columbia: An Evidence-based*

Report Prepared for the British Columbia Ministry of Health Planning. British Columbia Ministry of Health Planning.

Eaton, J. (2017). *Social relationships and bullying*. In J. Eaton (Ed.) A guide to mental health issues in girls and young women on the autism spectrum: Diagnosis, intervention and family support (pp. 81-95). Jessica Kingsley Publishers.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175-191.

Head, A.M., McGillivray, J.A., & Stokes, M.A. (2014). Gender differences in emotionality and sociability in children with autism spectrum disorders. *Molecular Autism, 5*, 5–19.

Hollocks, M. J., Lerh, J. W., Magiati, I., Meiser-Stedman, R., & Brugha, T. S. (2019). Anxiety and depression in adults with autism spectrum disorder: A systematic review and meta-analysis. *Psychological medicine*, *49*(4), 559-572.

Hull, L., Petrides, K. V., Allison, C., Smith, P., Baron-Cohen, S., Lai, M. C., & Mandy, W. (2017). “Putting on my best normal”: Social camouflaging in adults with autism spectrum conditions. *Journal of Autism and Developmental Disorders, 47*(8), 2519–2534.

Hunsley, J., & Mash, E. J. (Eds.). (2008). *A guide to assessments that work*. Oxford University Press.

IBM Corp. (2020). IBM SPSS Statistics for Macintosh, Version 27.0. Armonk, NY: IBM Corp.

Jamison, T. R., & Schuttler, J. O. (2015). Examining social competence, self-perception, quality of life, and internalizing and externalizing symptoms in adolescent females with and without autism spectrum disorder: A quantitative design including between-groups and correlational analyses. *Molecular Autism*, *6*(1), 1-16.

Jaswal, V. K., & Akhtar, N. (2019). Being versus appearing socially uninterested: Challenging assumptions about social motivation in autism. *Behavioral and Brain Sciences*, *1-14.*

Johnston, K. H. S., & Iarocci, G. (2017). Are generalized anxiety and depression symptoms associated with social competence in children with and without autism spectrum disorder? *Journal of Autism and Developmental Disorders, 47*(12), 3778-3788. https://doi.org/10.1007/s10803-017-3056-x

Kapp, S. (2019). How social deficit models exacerbate the medical model: Autism as case in point. *Autism Policy & Practice*, *2*(1), 3-28.

Kapp S., Goldknopf, E., Brooks, P. J., Kofner, B., & Hossain, M. (2019). Expanding the critique of the social motivation theory of autism with participatory and

developmental research. *The Behavioral and Brain Sciences*, *42*. https://doi.org/10.1017/S0140525X18002479

Kerns, C. M., Postorino, V., Vivanti, G., Bradshaw, J., Siracusano, M., Mazzone, L. (2017). Anxiety disorders and obsessive-compulsive disorder in individuals with autism spectrum disorder. *Current Psychiatry Reports, 19*(12*),* 1-8, https://doi.org/10.1007/s11920-017-0846-y

Kerns, C. M., Winder-Patel, B., Iosif, A. M., Nordahl, C. W., Heath, B., Solomon, M., & Amaral, D. G. (2020). Clinically significant anxiety in children with autism spectrum disorder and varied intellectual functioning. *Journal of Clinical Child and Adolescent Psychology*. 1-16. https://doi.org/10.1080/15374416.2019.1703712

Lai, M. C., Ameis, S. H., & Szatmari, P. (2017). *Young women on the autism spectrum.* In Gelbar, N. W. (Ed.). Adolescents with autism spectrum disorder: A clinical handbook. Oxford University Press.

Lai, M.C., & Szatmari, P. (2020). Sex and gender impacts on the behavioural presentation and recognition of autism. *Current Opinion in Psychiatry, 33*(2), 117–123.

Livingston, Shah, P., & Happé, F. (2019). Compensation in autism is not consistent with social motivation theory. *The Behavioral and Brain Sciences*, 42. https://doi.org/10.1017/S0140525X1800238

Lugo-Marín, J., Magan-Maganto, M., Rivero-Santana, A., Cuellar-Pompa, L., Alviani, M., Jenaro-Rio, C., ... & Canal-Bedia, R. (2019). Prevalence of psychiatric disorders in adults with autism spectrum disorder: A systematic review and meta-analysis. *Research in Autism Spectrum Disorders*, *59*, 22-33.

Lundin, K., Mahdi, S., Isaksson, J., & Bölte, S. (2021). Functional gender differences in autism: An international, multidisciplinary expert survey using the International Classification of Functioning, Disability, and Health model. *Autism*, *25*(4), 1020-1035.

Mayes, S. D., Calhoun, S. L., Murray, M. J., & Zahid, J. (2011). Variables associated with anxiety and depression in children with autism. Journal of Developmental and Physical Disabilities, 23(4), 325–337. https://doi.org/10.1007/2Fs10882-011-9231-7

Mazurek, M. O., & Kanne, S. M. (2010). Friendship and internalizing symptoms among children and adolescents with ASD. *Journal of Autism and Developmental Disorders, 40*(12), 1512–1520. doi:10.1007/s10803-010-1014-y

Myers, J.L., Well, A.D., & Lorch, R.F. (2010). More about correlation. In J.L. Myers, A.D. Well, & R.F. Lorch (Eds.), *Research Design and Statistical Analysis, 3rd edition* (pp.467-492). New York: Routledge Press.

Milton, D. E. (2012). On the ontological status of autism: the 'double empathy problem'. *Disability & Society*, *27*(6), 883-887.

Mitchell, P., Sheppard, E., & Cassidy, S. (2021). Autism and the double empathy problem: Implications for development and mental health. *British Journal of Developmental Psychology*, *39*(1), 1-18.

Mundy, P. (2019). Individual differences, social attention, and the history of the social motivation hypotheses of autism. *Behavioral and Brain Sciences, 42*, E103. doi:10.1017/S0140525X18002509

Neuhaus, E., Bernier, R. A., & Webb, S. J. (2021). Social motivation across multiple measures: Caregiver-report of children with autism spectrum disorder. *Autism Research*, *14*(2), 369-379.

Neuhaus, E., Webb, S. J., & Bernier, R. A. (2019). Linking social motivation with social skill: The role of emotion dysregulation in autism spectrum disorder. *Development and psychopathology*, *31*(3), 931-943.

Pezzimenti, F., Han, G. T., Vasa, R. A., & Gotham, K. (2019). Depression in youth with autism spectrum disorder. *Child and Adolescent Psychiatric Clinics*, *28*(3), 397-409.

Pouw, L. B., Rieffe, C., Stockmann, L., & Gadow, K. D. (2013). The link between emotion regulation, social functioning, and depression in boys with ASD. *Research in Autism Spectrum Disorders*, *7*(4), 549-556.

Ratcliffe, B., Wong, M., Dossetor, D., & Hayes, S. (2015). The association between social skills and mental health in school-aged children with autism spectrum disorder, with and without intellectual disability. *Journal of autism and developmental disorders*, *45*(8), 2487-2496.

Reynolds, C. R., & Kamphaus, R. W. (2004). Behavior assessment system for children-second edition. *Circle Pines, MN: American Guidance Service.*

Reynolds, C. R., & Kamphaus, R. W. (2015). Behavior assessment system for children–third edition (BASC-3). *Bloomington, MN: Pearson*.

Rivett, & Matson, J. L. (2011). Review of gender differences in core symptomatology in autism spectrum disorders. *Research in Autism Spectrum Disorders*, *5*(3), 957–976.

Rosenfield, & Mouzon, D. (2012). Gender and Mental Health. In *Handbook of the Sociology of Mental Health* (pp. 277–296). Springer Netherlands. https://doi.org/10.1007/978-94-007-4276-5_14

Saxe, A. (2017). The theory of intersectionality: A new lens for understanding the barriers faced by autistic women. *Canadian Journal of Disability Studies, 6*(4), 153–178.

Scheeren, A. M., Banerjee, R., Koot, H. M., & Begeer, S. (2016). Self-presentation and the role of perspective taking and social motivation in autism spectrum disorder. *Journal of Autism and Developmental Disorders, 46*(2), 649–657.

Sedgewick, F., Hill, V., & Pellicano, E. (2019). 'It's different for girls': Gender differences in the friendships and conflict of autistic and neurotypical adolescents. *Autism, 23*(5), 1119-1132.

Sedgewick, F., Hill, V., Yates, R., Pickering, L., & Pellicano, E. (2016). Gender differences in the social motivation and friendship experiences of autistic and non-autistic adolescents. *Journal of Autism and Developmental Disorders, 46*(4), 1297-1306

Sedgewick, F., Leppanen, J., & Tchanturia, K. (2020). Gender differences in mental health prevalence in autism. *Advances in Autism, 7*(3), 208-224.

Semrud-Clikeman, M. (2007). Social competence in children. In *Social Competence in Children* (pp. 1-9). Springer, Boston, MA.

Solomon, Miller, M., Taylor, S. L., Hinshaw, S. P., & Carter, C. S. (2011). Autism symptoms and internalizing psychopathology in girls and boys with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *42*(1), 48–59. https://doi.org/10.1007/s10803-011-1215-z

Spain, D., Sin, J., Linder, K. B., McMahon, J., & Happé, F. (2018). Social anxiety in autism spectrum disorder: A systematic review. *Research in Autism Spectrum Disorders, 52*, 51-68.

Statistics Canada. (2019). Canadian Health Survey on Children and Youth (CHSCY).

Sterling, L., Dawson, G., Estes, A., & Greenson, J. (2008). Characteristics associated with presence of depressive symptoms in adults with autism spectrum disorder. *Journal of autism and developmental disorders, 38*(6), 1011-1018.

Swain, D., Scarpa, A., White, S., & Laugeson, E. (2015). Emotion dysregulation and anxiety in adults with ASD: Does social motivation play a role? *Journal of Autism and Developmental Disorders, 45*(12), 3971-3977.

Tipton-Fisler, Rodriguez, G., Zeedyk, S. M., & Blacher, J. (2018). Stability of bullying and internalizing problems among adolescents with ASD, ID, or typical development. *Research in Developmental Disabilities*, *80*, 131–141. https://doi.org/10.1016/j.ridd.2018.06.004

Trevisan DA, Tafreshi D, Slaney KL, Yager J, Iarocci G (2018) A psychometric evaluation of the Multidimensional Social Competence Scale (MSCS) for young adults. PLoS ONE 13(11): e0206800. https://doi.org/10.1371/journal. pone.0206800

Vasa, R. A., Kalb, L., Mazurek, M., Kanne, S., Freedman, B., Keefer, A., ... & Murray, D. (2013). Age-related differences in the prevalence and correlates of anxiety in youth with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *7*(11), 1358-1369.

Wechsler, D. (2011). WASI-II: Wechsler abbreviated scale of intelligence (2nd ed.). San Antonio, TX: Psychological Corporation.

Wing, L., & Gould, J. (1979). Severe impairments of social interaction and associated abnormalities in children: Epidemiology and classification. *Journal of autism and developmental disorders*, *9*(1), 11-29.

Wood-Downie, H., Wong, B., Kovshoff, H., Cortese, S., & Hadwin, J. A. (2021). Research review: A systematic review and meta-analysis of sex/gender differences in social interaction and communication in autistic and nonautistic children and adolescents. *Journal of Child Psychology and Psychiatry, 62*(8), 922-936.

Yager, J., & Iarocci, G. (2013). The development of the multidimensional social competence scale: A standardized measure of social competence in autism spectrum disorders. *Autism Research, 6*(6), 631-641.

Appendix A.

Family Demographics Questionnaire Items

- Your name
- Child's name
- Your relationship to child
- What is your child's birth date?
- What is your child's gender?
- What is your child's dominant hand?
- Does your child wear glasses?
- Is your child colour blind?
- What is your child's cultural or ethnic background?
- With whom does your child live?
- Approximate gross family income
    - (Less than $20,000, $20,000 to $49,999, $50,000 to $79,999, $80,000 to $109,999, $110,000 to $139,999, greater than $140,000)
- Highest level of education for Caregiver 1
    - (Elementary school, high school, professional diploma, Bachelor's degree, Master's degree or higher, other)
- Highest level of education for Caregiver 2
    - (Elementary school, high school, professional diploma, Bachelor's degree, Master's degree or higher, other)
- Which of the following does your child attend?
    - (Child is home-schooled, child attends public school, other)
- What grade is your child in?
- Is your child diagnosed with one of the following? Please select all that apply
    - (Autism Spectrum Disorder (e.g., Autism, Asperger's Syndrome, PDD-NOS [Pervasive Developmental Disorder - Not Otherwise Specified]), other (Please state all: e.g., Intellectual Disability, ADHD, Anxiety Disorder, Depression, Learning Disorders, Sleeping Disorders, etc.), no diagnosis)
- Please select all that apply. Has your child had a…

    - (Brain injury, brain surgery, metal implant, none)
- Does your child have any other medical conditions?
    - (Yes, no)
- If your child has been diagnosed with autism, please answer the following information:
    - When was your child diagnosed (what year and what age?)
- What kind of professional diagnosed your child?
    - (Pediatrician, family doctor, psychologist, psychiatrist)
- Which agency provides your family with funding for services?
    - (BC Ministry of Children and Family Development, Community Living BC, none, other)
- What is the child's primary language spoken at home?
- Other language(s) spoken?
- What languages are your child fluent in? Please comment on their proficiency
- In general, is there any other information we should know about your child?

Appendix B.

Behaviour Assessment System for Children, Second Edition (BASC- 2) Internalizing Problems Composite Items (Reynolds & Kamphaus, 2004)

Likert Scale Response Options

Never

Sometimes

Often

Almost Always

Parent Rating Scale for Children

Anxiety Subscale

- Worries
- Worries about what teachers think
- Is too serious
- Worries about making mistakes
- Worries about what parents think
- Worries about schoolwork
- Is fearful
- Tries too hard to please others
- Is nervous
- Worries about things that cannot be changed
- Says, "I'm afraid I will make a mistake”
- Says, "I'm not very good at this."
- Says, "It's all my fault."
- Worries about what other children think

Depression Subscale

- Is easily upset
- Complains about being teased

- Cries easily
- Says, "Nobody understands me."
- Complains about not having friends
- Says, "Nobody likes me."
- Is negative about things
- Says, "I don't have any friends."
- Says, "I want to die" or “I wish I was dead”
- Says, "I hate myself."
- Is sad
- Seems lonely
- Says, "I want to kill myself."
- Changes moods quickly

Somatization Subscale

- Expresses fear of getting sick
- Complains of pain
- Has stomach problems
- Says, "I think I'm sick."
- Has headaches
- Complains about health
- Gets sick
- Has fevers
- Is afraid of getting sick
- Complains of being sick when nothing is wrong
- Vomits
- Complains of shortness of breath

Parent Rating Scale for Adolescents

Anxiety Subscale

- Worries about making mistakes
- Is nervous
- Says, “I’m not good at this”
- Worries about what teachers think
- Tries too hard to please others

- Says, “I get nervous during tests” or “Tests make me nervous”
- Worries about things that cannot be changed
- Worries about what other adolescents think
- Is fearful
- Worries
- Says, “I’m afraid I will make a mistake”

Depression Subscale

- Cries easily
- Complains about being teased
- Says, “Nobody understands me”
- Is negative about things
- Says, “I hate myself”
- Says, “I want to kill myself”
- Changes moods quickly
- Is easily upset
- Says, “I want to die” or “I wish I were dead”
- Seems lonely
- Says, “Nobody likes me”
- Says, “I don’t have any friends”
- Is sad

Somatization Subscale

- Expresses fear of getting sick
- Complains of pain
- Has stomach problems
- Says, "I think I'm sick."
- Has headaches
- Complains about health
- Gets sick
- Has fevers
- Is afraid of getting sick
- Complains of being sick when nothing is wrong
- Vomits
- Complains of shortness of breath

Appendix C.

Behaviour Assessment System for Children, Third Edition (BASC- 3) Internalizing Problems Composite Items (Reynolds & Kamphaus, 2015)

Likert Scale Response Options

Never

Sometimes

Often

Almost Always

Parent Rating Scale for Children

Anxiety Subscale

- Worries
- Is fearful
- Appears tense
- Worries about things that cannot be changed
- Worries about what other children think
- Worries about what parents think
- Is nervous
- Says, "It's all my fault."
- Worries about what teachers think
- Says, "I'm not very good at this."
- Worries about making mistakes
- Has panic attacks
- Is easily stressed
- Says, "I'm afraid I will make a mistake."

Depression Subscale

- Is easily upset
- Cries easily

- Changes moods quickly
- Says, "I hate myself."
- Says, "I want to die" or "I wish I were dead."
- Is sad
- Says, "I don't have any friends."
- Seems lonely
- Is negative about things
- Says, "I can't do anything right."
- Is irritable
- Says, "I want to kill myself."
- Says, "Nobody likes me."

Somatization Subscale

- Gets sick
- Complains about health
- Says, "I think I'm sick."
- Complains of being sick when nothing is wrong
- Complains of pain
- Vomits
- Expresses fear of getting sick
- Has headaches
- Has fevers
- Complains of physical problems
- Complains of stomach pain
- Is afraid of getting sick

Parent Rating Scale for Adolescents

Anxiety Subscale

- Worries
- Is fearful
- Is easily stressed

- Is nervous
- Worries about what teachers think
- Says, “I’m not very good at this”
- Worries about making mistakes
- Worries about things that cannot be changed
- Appears tense
- Has panic attacks
- Says, “I’m afraid I will make a mistake”
- Says, “I get nervous during tests” or “Tests make me nervous”
- Has trouble making decisions

Depression Subscale

- Is easily upset
- Is sad
- Says, “I hate myself”
- Changes mood quickly
- Says, “I want to die” or “I wish I were dead”
- Says, “I don’t have any friends”
- Cries easily
- Seems lonely
- Is negative about things
- Says, “I can’t do anything right”
- Says, “I want to kill myself”
- Says, “Nobody likes me”
- Is irritable

Somatization Subscale

- Complains of being sick when nothing is wrong
- Says, “I think I’m sick”
- Gets sick
- Complains about health
- Complains of pain
- Expresses fear of getting sick

- Complains of stomach pain
- Has headaches
- Complains of physical problems
- Is afraid of getting sick

Appendix D.

Multidimensional Social Competence Scale (MSCS) Social Motivation Domain Items (Yager & Iarocci, 2013)

Likert Scale Response Options

Not true or almost never true

Rarely true

Sometimes true

Often true

Very true or almost always true

- Prefers to spend time alone (e.g., may seem most content when left on his/her own)
- Enjoys meeting new people
- Initiates friendly social “chit-chat” with people (e.g., asks about what’s new with the other person, talks about the weather or events). These are casual conversations that often have no specific purpose
- Stays in the “background” in group social situations (e.g., keeps to him/herself, may not be noticed)
- Asks people questions about themselves or their lives (e.g., how they are, what they’ve been up to)
- Avoids talking to people when possible (e.g., looks, moves, or walks away)
- Needs to be told or prompted to talk or interact with people
- Seeks out people to spend time with (e.g., friends, other kids)
- Initiates play with other kids
- Shows little interest in people
- Introduces him/herself to people (without being told to)

Appendix E.

Behaviour Assessment System for Children (BASC) Composite and Subscale Scores

Table E1

BASC Composite and Subscale Scores Across Autistic and Non-Autistic Girls and Boys

	Autistic Participants (*n* = 189)		Non-Autistic Participants (*n* = 197)	
	Girls (*n* = 43)	Boys (*n* = 146)	Girls (*n* = 90)	Boys (*n* = 107)
Composites and Subscales	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Externalizing Problems	58.40 (11.38)	57.68 (10.20)	50.21 (9.78)	51.99 (9.32)
Hyperactivity	62.52 (12.95)	62.66 (11.91)	49.82 (10.63)	52.00 (10.73)
Aggression	55.21 (10.02)	54.70 (10.89)	50.99 (9.36)	51.49 (8.16)
Conduct Problems	54.71 (11.30)	53.33 (10.43)	49.77 (10.53)	51.79 (9.83)
Internalizing Problems	60.83 (14.57)	58.52 (12.89)	49.17 (10.64)	52.38 (11.14)
Anxiety	59.91 (13.99)	55.99 (12.54)	48.83 (10.46)	52.72 (11.67)
Depression	61.24 (14.43)	60.43 (13.31)	50.56 (9.80)	53.00 (10.51)
Somatization	54.40 (13.65)	55.17 (14.23)	48.52 (10.73)	49.29 (10.66)
Behavior Symptoms	67.17 (11.11)	67.17 (10.59)	50.91 (10.07)	53.00 (10.90)
Atypicality	70.21 (13.11)	69.95 (13.77)	51.18 (11.45)	53.05 (11.64)
Withdrawal	68.05 (16.27)	68.37 (13.11)	51.56 (11.97)	53.18 (12.00)
Attention Problems	62.36 (8.17)	61.61 (8.15)	50.31 (9.87)	51.89 (11.53)
Adaptive Skills	33.81 (7.28)	34.86 (7.19)	50.22 (9.22)	48.23 (10.04)
Adaptability	37.21 (9.44)	37.64 (8.59)	49.72 (9.18)	48.87 (9.95)
Social Skills	36.33 (7.82)	37.82 (8.53)	49.97 (8.90)	48.22 (10.36)
Leadership	37.62 (6.50)	39.24 (7.33)	52.62 (9.90)	51.10 (7.33)
Activities of Daily Living	34.29 (8.84)	35.62 (8.79)	48.11 (8.95)	46.37 (9.47)
Functional Communication	33.81 (8.38)	35.50 (9.13)	50.47 (10.47)	47.71 (10.39)

Appendix F.

Multidimensional Social Competence Scale (MSCS) Domain and Total Scores

Table F1

MSCS Domain and Total Scores Across Autistic and Non-Autistic Girls and Boys

	Autistic Participants (*n* = 189)		Non-Autistic Participants (*n* = 197)	
	Girls (*n* = 43)	Boys (*n* = 146)	Girls (*n* = 90)	Boys (*n* = 107)
Domains	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Social Motivation	30.56 (6.84)	29.49 (7.40)	40.90 (6.99)	39.28 (7.24)
Empathic Concern	32.81 (5.89)	31.14 (7.39)	43.04 (6.96)	39.79 (7.65)
Nonverbal Sending	37.07 (6.78)	35.83 (7.19)	47.86 (6.32)	45.79 (7.06)
Social Inference	27.50 (6.37)	26.25 (6.02)	41.53 (6.43)	39.36 (7.27)
Social Knowledge	31.90 (6.57)	31.14 (6.57)	45.13 (5.65)	42.13 (7.19)
Verbal Conversation	28.38 (7.09)	26.00 (7.09)	40.64 (7.20)	38.41 (8.46)
Emotion Regulation	29.02 (7.91)	28.05 (7.00)	39.67 (6.73)	36.75 (7.71)
Total Score	217.38 (29.29)	207.82 (30.25)	298.77 (36.60)	281.54 (42.24)