

**THEORY OF MIND, EMOTIONAL INTELLIGENCE, AND SOCIAL STRESS IN
ADOLESCENTS WITH HFASD**

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Abstract

Many individuals with High-Functioning Autism Spectrum Disorder (HFASD) experience difficulties communicating effectively in their social world. It has been suggested that low levels of theory of mind, the ability to recognize that other individuals have unique beliefs, desires, emotions, and perspectives, may be a significant contributing factor to these social communicative challenges. Many current interventions focus on increasing theory of mind ability in individuals with HFASD. However, preliminary research shows that theory of mind interventions may have an unintended consequence of increasing the level of stress these individuals experience in social situations. This study explores the impact of both theory of mind and emotional intelligence on the social stress level of individuals with HFASD. Results from this study suggest that introducing emotional intelligence components to current theory of mind interventions may increase the individual's understanding of others and their ability to succeed socially without increasing their level of social stress.

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Table of Contents

Abstract iii

Acknowledgements iv

Table of Contents v

List of Tables viii

Chapter One: Overview and Introduction 1

 Introduction 1

 Research Question 4

 Hypotheses 5

Chapter Two: Literature Review 6

 Autism Spectrum Disorder 6

 Diagnostic Criteria of ASD 6

 High Functioning ASD (HFASD) 9

 Theory of Mind 11

 Social Importance of Theory of Mind 12

 Theory of Mind in HFASD 16

 Hypotheses surrounding low levels of theory of mind in
 HFASD 16

 Emotional Intelligence 19

 Social Importance of Emotional Intelligence 20

 Emotional Intelligence in HFASD 23

 Theory of Mind and Emotional Intelligence 25

 Social Stress in HFASD 27

Impact of Theory of Mind and Emotional Intelligence on Social Stress in those with HFASD	28
Chapter Three: Methods	31
Participants	32
Materials	35
Intelligence	35
Autism Spectrum Symptomatology	35
Autism Spectrum Severity	36
Theory of Mind	36
Emotional Intelligence	37
Social Stress	38
Procedure	38
Method of Analysis	39
Chapter Four: Results	41
Data Screening	42
Missing Data	43
Distributions	43
Descriptive Statistics	45
Research Question One	46
Research Question Two	49
Chapter Five: Discussion	50
Interpretation of the Results	51
Emotional Intelligence	53

Theory of Mind	56
Social Stress	58
Implications for Practitioners and Therapists	63
Study Limitations and Suggestions for Future Research	67
Sample Size	67
Self-Report	68
Diagnostic Considerations	69
Future Research	70
Summary	71
References	73
Appendices	101
A: Ethics Approval for the University of Saskatchewan	101
B: Ethics Approval for the University of Manitoba	102
C: Ethics Approval for the University of Calgary	103
D: Ethics Approval for the University of Lethbridge	104

List of Tables

Table

1. Skewness and Kurtosis Values	44
2. Descriptive Statistics	46
3. The Bivariate and Partial Correlations of the Predictors with Social Stress in the HFASD Group	48
4. The Bivariate and Partial Correlations of the Predictors with Social Stress in the Control Group	49

Chapter One: Overview and Introduction

Autism spectrum disorder (ASD) is characterized by underdeveloped social interaction and communicative abilities, as well as repetitive patterns of behaviour (American Psychiatric Association [APA], 2013). A subset of individuals within the autism spectrum exhibit underdeveloped intellectual or language abilities; these individuals are often referred to as displaying High-Functioning ASD (HFASD; APA, 2013). Due to the intact cognitive abilities of individuals with HFASD, attention is drawn to their difficulties within social interaction and communication (Lopata, Volker, Putnam, Thomeer, & Nida, 2008). These social and emotional challenges cause difficulties in many important areas of functioning, including within interpersonal and vocational domains (APA 2013). Thus, individuals with HFASD often have difficulties living independently in adulthood, as it may be challenging for these individuals to interact with others, as well as to maintain paid employment (Howlin, 2000; Tsatsanis, 2003), despite their typically intact cognitive abilities. Importantly, it appears that early diagnosis and intervention may improve the quality of life, and thus long-term outcome, for these individuals (Tidmarsh & Volkmar, 2003). Early intervention and appropriate support for individuals with HFASD can help minimize challenging experiences and ensure that existing skills are developed to their fullest (Howlin, 2000). Further, the positive impact of effective professional and peer support found in early intervention can mitigate the negative impact of social and emotional challenges on an individual's quality of life (Renty & Roeyers, 2006). To improve these individual's quality of life, the individual must perceive the intervention as personally supportive (Renty & Roeyers, 2006).

Consequently, establishing effective early interventions is of great importance to the researchers and professionals who work with children and adolescents with HFASD

One of the primary areas of difficulty that individuals with HFASD experience is in social cognition (Mazza et al., 2017), and as a result, social cognition has become the focus in many interventions. Social cognition focuses on the cognitive mechanisms needed to process the social world (Mazza et al., 2017). One area of study in the field of social cognition is theory of mind development. Theory of mind is the ability to attribute mental states to others, such as beliefs, desires, emotions, and intentions (Premack & Woodruff, 1978). Theory of mind is crucial to successful social interactions (Saxe, Carey, & Kanwisher, 2004), as it is used to predict and interpret the behaviour of others (Ferguson & Austin, 2010). In contrast to typically developing individuals who use theory of mind to excel in social situations, theory of mind tends to be impaired in individuals with ASD from infancy, including those with HFASD (Baron-Cohen, Leslie, & Frith, 1985; Mazza et al., 2017), and ultimately contributes significantly to the social difficulties these individuals experience. Thus, interventions are typically aimed at further developing theory of mind in those with HFASD in hopes that they will experience more positive social outcomes.

Another related, yet distinct, concept that influences an individual's ability to successfully function in a social capacity is emotional intelligence (Ferguson & Austin, 2010). Emotional intelligence involves the ability to appropriately express and accurately perceive and identify the emotions of others (Ferguson & Austin, 2010). Emotional intelligence is framed within two main theories: the first describes this concept as a cognitive ability (ability models; Mayer & Salovey, 1997) and the second defines it as a

personality trait (trait models; Bar-On, 1997). Regardless of the model, both versions of emotional intelligence contribute greatly to successful social interactions for typically developing individuals (Ferguson & Austin, 2010). Importantly, both ability and trait emotional intelligence tend to be consistently and significantly lower in individuals with ASD than in their typically developing peers (Boily, Kingston, & Montgomery, 2017). Deficits in emotional intelligence not only impede social success for individuals with HFASD, but also contribute to distress, subsequently heightening the individual's risk for depression and/or anxiety (Bellini, 2004; Boily et al., 2017; Vickerstaff, Heriot, Wong, Lopes, & Dossetor, 2007).

Impaired theory of mind and emotional intelligence are often the foci of interventions for individuals with HFASD, as these competences have improved social abilities in typically developing individuals (Liddle & Nettle, 2006). It is important to note however, that the relationships between theory of mind, emotional intelligence and social competence observed in typically developing individuals may not commensurate with those found in individuals with HFASD. Preliminary evidence suggests that increased theory of mind and underdeveloped emotional intelligence may be associated with higher levels of social stress in adolescents with HFASD (Montgomery, Stoesz, & McCrimmon, 2012). Simply stated, when individuals with HFASD develop theory of mind without further developing emotional intelligence, they are also increasingly aware of their social and emotional challenges, relative to other individuals of a similar age. This greater understanding of the perspectives of others, which may not always be positive, may increase the stress experienced in social contexts for these individuals. Consequently, this may exacerbate the social challenges these individuals experience in

their social interactions. The paucity of research regarding the nature of the relationship between theory of mind, emotional intelligence, and social stress in individuals with HFASD, relative to individuals who are typically developing, suggests this is an area of study that is critical to investigate further.

This study aimed to gain insight into the relationship between theory of mind, emotional intelligence, and social stress in individuals with HFASD during the critical developmental transition into adulthood. The outcome of this research is likely to have important implications for interventions. Understanding how theory of mind and emotional intelligence interventions impact the social stress levels of those that are typically developing relative to those with HFASD, may further inform the treatment approach of practitioners in a way that better serves the unique needs of this population. As an example, although theory of mind and emotional intelligence may be targeted separately in social skills interventions for those that are typically developing, interventions for those with HFASD may need to increase theory of mind while concurrently building emotional intelligence levels to most effectively meet the social and emotional needs of these individuals. A more comprehensive understanding of this relationship has the potential to improve the effectiveness of existing social and emotional interventions for those with HFASD and consequently, to positively impact their mental health. Ultimately, the hope is that it might also help to ease the transition into adulthood for late adolescents with HFASD.

Research Questions

This study explored the relationships between theory of mind, emotional intelligence and social stress by answering the following questions:

- (a) To what extent do increases in performance on an advanced theory of mind test and an emotional intelligence inventory affect the social stress levels of adolescents with HFASD?
- (b) To what extent does performance on an advanced theory of mind test and on an emotional intelligence inventory affect social stress levels differently for individuals with HFASD when compared to their age- and sex-matched typically developing peers?

Hypotheses

Based on previous research (Liddle & Nettle, 2006; Montgomery et al., 2012), it is hypothesized that increased performance on theory of mind and emotional intelligence measures will decrease social stress levels in typically developing individuals. Importantly however, heightened theory of mind scores and low emotional intelligence scores are hypothesized to increase social stress levels in individuals with HFASD. Thus, theory of mind is hypothesized to be positively related to social stress while emotional intelligence is negatively related to social stress. This is thought to be the case for individuals with HFASD, as it is hypothesized that increased theory of mind abilities may enhance awareness of both positive and negative social cues for these individuals, as they would be better able to interpret emotional information through facial expressions and emotionally laden communication. Consequently, it is possible that further developing theory of mind through interventions, without concurrently increasing emotional intelligence, may lead to higher levels of stress in social situations due to the lack of social and emotional knowledge and skills needed to respond to this increased understanding of others' perspectives.

Chapter Two: Literature Review

Theory of mind, emotional intelligence, social stress, and HFASD are all complex concepts on their own and become increasingly multifaceted when they are studied together. This literature review will begin by discussing the diagnostic symptomatology of ASD and move into the importance of finding effective interventions for those with HFASD. Next, the concept of theory of mind will be explored, its developmental trajectory in individuals with HFASD, and its importance to social communicative abilities. Emotional intelligence will then be examined through both the ability and trait perspectives. The ways in which theory of mind and emotional intelligence relate will be discussed (as they are extremely similar, yet distinct, concepts). The final portion of this literature review will explore how social stress impacts those with HFASD. Finally, all of these variables are drawn together by exploring potential reasons for their distinct relationship throughout previous literature.

Autism Spectrum Disorder

Diagnostic criteria of ASD. ASD is characterized by social communicative developmental delays, as well as restrictive and repetitive patterns of behaviour, interests and activities, and diagnostic criteria across both domains must be met to receive an ASD diagnosis (APA, 2013). Diagnostic criteria outline the persistent deficits in social communication and interaction that individuals on the autism spectrum experience across multiple contexts throughout their life (Ahlstrom & Wents, 2014). These social deficits manifest through challenges in social-emotional reciprocity, nonverbal communicative behaviors, and consequently, in understanding, developing, and maintaining relationships (APA, 2013). Individuals with ASD may display their difficulties with social-emotional

reciprocity through atypical approaches to social situations, or lack thereof completely. As an example, these deficits are frequently evident in difficulties in typical reciprocal conversations, which require adherence to conversational rules such as turn-taking during discourse, and not only discussing one's own areas of interest (Bauminger-Zviely, Karin, Kimhi, & Agam-Ben-Artzi, 2013; Nadig, Lee, Singh, Bosshart, & Ozonoff, 2010). These social reciprocity and conversation skills first emerge in early childhood, having been overserved in typically developing children by the age of three to five years (Adams, 2002). In addition, individuals with ASD may display disinterest in peers, or an inability to appropriately adjust their behaviour for specific social contexts (APA, 2013). Deficits in nonverbal communicative behaviors used for social interaction are also evident in poor eye contact, lack of facial expressions, and/or atypical body language, such as difficulties using gestures appropriately (APA, 2013).

The second diagnostic domain outlines the restricted and repetitive patterns of behavior, interests, or activities observed in individuals on the autism spectrum (APA, 2013). An ASD diagnosis requires the presence of at least two of the following four characteristics: (a) stereotyped/repetitive motor movements, speech and/or use of objects (e.g., simple motor stereotypies, echolalia); (b) insistence on sameness and anxiety around change, rigidity to specific routines, or ritualistic patterns of speech or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions); (c) restrictions due to being engrossed by their interests, which are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests); and (d) hyperactivity or hypoactivity in their relationship with sensory input (e.g., aversion to specific sounds or textures in the

environment, apparent indifference to pain/temperature) (APA, 2013; Wozniak, Leezenbaum, Northrup, West, & Iverson, 2016).

In addition to the two primary diagnostic domains pertaining to deficits in social communication and interaction and restricted, repetitive patterns of behavior, interests or activities, individuals must meet three additional criteria within the DSM-5 to be diagnosed with ASD (APA, 2013). Firstly, these symptoms must be present in the individual early in development, typically recognized during the second year of life, however, it is possible that the disorder may not fully manifest until later in life when the individual does not have the capacities or abilities to deal with current social demands (APA, 2013; Lauristen, 2013). Secondly, ASD symptoms must cause clinically significant difficulties, challenges, and impairments in important areas of functioning, such as in social or occupational aspects of one's life (APA, 2013; Cederlund, Hagberg, Billstedt, Gillberg, & Gillberg, 2008). And finally, the symptoms that the individual is experiencing must not be better explained by an intellectual disability or global developmental delay (APA, 2013). Along with giving an individual the diagnosis of ASD, the clinician, such as a psychologist or psychiatrist, must also specify if the individual does or does not have an accompanying intellectual or language impairment, related medical or genetic condition, environmental factor, or neurodevelopmental, mental or behavioral disorder, and if catatonia is present (APA, 2013).

ASD symptomatology will often be observable throughout the lifetime, causing continuous impairment in important areas of functioning (Wozniak et al., 2016). Fortunately, however, ASD is not degenerative and, with effective intervention, individuals may be able to improve their life outcomes (e.g., Corbett et al., 2013;

Derosier, Swick, Davis, McMillen, & Mathews, 2010). Many individuals with ASD develop supports and compensatory coping strategies that assist them with their social and emotional struggles in specific contexts as they age (Howlin, 2000). As an example, some individuals with HFASD may learn to suppress repetitive behaviour in public (APA, 2013). However, these individuals tend to be at increased risk of developing anxiety or depressive disorders (Simonoff et al., 2008). Consequently, early intervention addressing emotional and social difficulties associated with ASD, as well as coping skills for possible comorbid disorders, is crucial to long-term success (Howlin, 2000; Tidmarsh & Volkmar, 2003).

High-functioning ASD (HFASD). With the fifth edition of the DSM, the category of ASD replaced previously used categories, such as pervasive developmental disorder and Asperger's syndrome (APA, 2000; APA, 2013). In the fourth edition of the DSM, Asperger's syndrome was differentiated from autistic disorder by an average to above average intelligence and often typically developing speech and language abilities. In comparison, those with autistic disorder often display language delays and present with below average intelligence (APA, 2000). Similarly, HFASD has been the term used for individuals with ASD who do not have intellectual or language impairments.

Additionally, the DSM-V states that individuals who had a well-established diagnosis of autistic disorder, Asperger's disorder, or pervasive developmental disorder not otherwise specified from the DSM-IV before the changes were made should be given the diagnosis of autism spectrum disorder (APA, 2013). Thus, those that previously were diagnosed with Asperger syndrome have been referred to as having HFASD.

For these high functioning individuals, a higher level of cognitive ability and a lack of underdeveloped receptive and expressive language abilities often draws a much greater focus to their social competence challenges (Lopata et al., 2008). The major focus of the deficits of HFASD can be seen in their social interaction and communication skills, being that they often do not experience intellectual deficits. These individuals may be able to live and work independently and possibly find a niche that matches their special interests and skills, however, they typically remain socially naïve and face challenges with the practical demands of trying to ‘fit in’ to an ever-changing society (APA, 2013; Howlin, 2000). Longitudinal studies have suggested that around 74% of individuals with HFASD will have fair to good long-term outcomes, suggesting that a large majority of these individuals are able to live independently and function successfully in other areas of life (Cederlund et al., 2008). Although the rate of individuals with HFASD who have positive long-term outcomes is relatively high compared to individuals on the autism spectrum who have an intellectual or verbal impairment, it is crucial that researchers continue to investigate the efficacy of current early intervention strategies in order to continue to improve these outcome statistics. Examining individuals with HFASD who are in late adolescence will likely offer some insight regarding how these early interventions affect individuals who are still young enough that they may have not yet developed compensation mechanisms to succeed socially. One of the most common foci of early interventions for this population is the concept of theory of mind, as increasing this ability is thought to improve social functioning (Hofmann et al., 2016), and may consequently ease the transition into adulthood for these adolescents.

Theory of Mind

Individuals with a developed theory of mind understand that people have different mental states, such as thoughts, perceptions, emotions, beliefs and intentions (Flavell, 2004; Wellman, 2014). Thus, well-developed theory of mind abilities allow for increased insight into the perspective of others, and ultimately to greater social success. The phrase “theory of mind” was coined by Premack and Woodruff (1978) in their seminal study regarding whether chimpanzees could accurately match a picture of a human actor struggling with a problem to the picture that displayed an appropriate solution. To solve the problems, chimpanzees had to understand the actor’s purpose, thereby demonstrating that primates have a theory of mind (Premack & Woodruff, 1978). This study was the first to make the assumption that this ability to recognize and understand another individual’s thoughts, wants, beliefs, and other mental states played an important role in anticipating and predicting the behaviour of others (Premack & Woodruff, 1978). As a result, these individuals are able to read other individuals more successfully in social situations.

Wimmer and Perner (1983) were the first known researchers to explore the concept of theory of mind in children. Wimmer and Perner’s (1983) young participants (who ranged in age from three to nine years) participated in false belief tests to examine their theory of mind. False-belief tests measure one’s ability to recognize that another person holds an inaccurate belief, an ability that requires theory of mind (Hofmann et al., 2016). A false belief test is typically presented as a scenario in which a character (e.g., puppet) knows where an object (e.g., marble) is located and when the puppet is absent, the object is moved without the character’s knowledge. The participant is asked by the

researchers where the character in the story will look for the object upon their return (Wimmer & Perner, 1983). Understanding that the individual in the story will look in the place that the object was when they last saw it, and not where it has been moved, requires a developed theory of mind to understand the character's false belief. These tests are commonly used to examine one's theory of mind because they require the individual to take the perspective of the character in the story. By the age of three or four, typically developing children are usually able to successfully complete false belief tests (Wimmer & Perner, 1983).

A landmark study by Baron-Cohen, Leslie, and Frith (1985) demonstrated that children with ASD struggle with false belief understanding, and tend to have impaired theory of mind. These individuals seem to lack the understanding that others have different beliefs than themselves, which subsequently weakens their ability to predict the behaviour of others (Baron-Cohen et al., 1985). The deficits seen in theory of mind in individuals with ASD appear to be unrelated to intellectual abilities, as the impairment seems to be present in individuals with ASD regardless of his or her intelligence quotient (IQ) (Baron-Cohen et al., 1985). Thus, those with HFASD, who have intellectual abilities within the average range, are not exempt from deficits in their theory of mind abilities (Montgomery et al., 2012).

Social importance of theory of mind. As an incredibly important cognitive developmental milestone, theory of mind highlights the progression and growth of a child's abilities in social interaction, communication, and understanding (Repacholi & Slaughter, 2003). With a theory of mind, children are able to not only understand the mental states of others, but also use this understanding to console, cooperate, and

coordinate their behaviour with the desires and beliefs of others (Astington, 2003; Miller, 2009). Theory of mind positively mediates success in communication, as an understanding of the communicative partner's mental state allows the individual to communicate in a manner that takes into account the partner's knowledge or perspective, which consequently helps the partner to interpret the communication appropriately (Sergienko & Ulanova, 2016). Additionally, those with a more developed theory of mind have also been viewed more positively among their peers (Slaughter, Imuta, Peterson, & Henry, 2015). Individuals who can relate to their peers through shared beliefs and respond appropriately tend to be more likely to develop and maintain friendships. In sum, theory of mind allows one to analyze and predict success in everyday social interaction (Wellman, 1990). Without the abilities of theory of mind, important aspects of an individual's social interactions are frequently quite challenging, as is often the case for individuals with HFASD.

Another social behaviour that is associated with theory of mind development is lying. Lying often occurs as a result of a self-benefiting aim, such as avoiding punishment or trying to obtain a reward (DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996). Lying is directly related to theory of mind, as the individual must infer the mental state of a person they are in communication with and use this information to determine if there will be a negative personal consequence if they choose to tell the truth (Talwar, Gordon, & Lee, 2007). To lie successfully, individuals must use this knowledge of their own, as well as the other individual's mental state to construct and produce false statements (Talwar et al., 2007). Without theory of mind, individuals would not understand that the other person is able to hold false beliefs, as discussed previously.

Indeed, helping young children to develop a theory of mind also results in the development of the ability to lie (Ding, Wellman, Wang, Fu, & Lee, 2015). Specifically, the more developed an individual's theory of mind, the more likely they are to engage in self-benefiting lying (Fu, Sai, Yuan, & Lee, 2017). Along with the aim of deceiving, this theory of mind development can also be used to manipulate others' mental states with the aim of teasing (Miller, 2009). Thus, theory of mind abilities can be used in many everyday life situations, under both adaptive or maladaptive pretenses, such as with the intent of building healthy relationships versus the intent to purposefully deceive another individual for personal benefit. While theory of mind interventions are not aimed at increasing lying abilities in those with HFASD, not understanding the purpose of a small lie, friendly teasing, or other types of more subtle communication that are not truthful may place individuals with HFASD at a social disadvantage, relative to their typically developing peers (Loukusa & Moilanen, 2009). For example, abstaining from telling a friend a harsh truth to protect their feelings may be a form of deception that is typically seen as socially acceptable, a concept which some individuals with HFASD may not understand.

The crucial component that theory of mind contributes to social interactions can be seen in Hofmann and colleagues (2016) study that aimed to improve their participants' theory of mind skills. This research was done with typically developing children, and suggests that theory of mind training procedures are effective in improving children's theory of mind skills, across both age and gender (Hofmann et al., 2016). Aspects of the theory of mind training that were helpful were corrective feedback, modeling, use of imagination, and role-play (Hofmann et al., 2016). Typical theory of mind interventions

often last around 15–20 minutes and are done in an individual format (Hofmann et al., 2016). Thus, these interventions are generally not time-consuming, could potentially be implemented in a one-to-one school counsellor setting, and have shown positive preliminary results.

Research exploring the effects of theory of mind training on individuals with HFASD has been less promising. While it is possible to teach children with ASD to have success with tasks concerning the emotions and beliefs of others, they do not consistently demonstrate advances in social communication skills (Hadwin, Baron-Cohen, Howlin, & Hill, 1997). These children were able to provide direct answers to direct questions, but still experienced social communication impairments, as evidenced by their struggles to develop conversation to any significant degree despite the training (Hadwin et al., 1997). While individuals with ASD are often capable of understanding the theoretical principles of mental state reasoning, they frequently still fail to apply these theoretical principles to their day-to-day social interactions, which highlights a discrepancy between knowledge and application within this population (Begeer et al., 2011; Scheeren, Rosnay, Koot, & Begeer, 2012). Additionally, these individuals often did not experience improvement in self-reported empathic skills, such as appropriate emotional reactions, or social behaviour as reported by parents, which includes appropriate behavioural expressions and an understanding of social information (Begeer et al., 2011). Although this research was conducted with individuals with ASD, it highlights the challenges that individuals with HFASD face. Individuals with HFASD are often able to cognitively comprehend concepts, yet they encounter challenges when attempting to apply their knowledge of these concepts to succeed in their social world (APA, 2013). Therefore, the goal of

increasing the social abilities of individuals with HFASD exclusively through theory of mind training appears somewhat simplistic in light of the complex social and emotional needs that individuals on the autism spectrum have.

Theory of mind in HFASD. As mentioned previously, the social difficulties that individuals with HFASD experience are not related to general cognitive abilities, but instead stem from underdeveloped social cognition competencies (Ziv, Hadad, Khateeb, & Terkel-Dawer, 2014). In terms of difficulties experienced in social interaction and communicative impairments, deficits in theory of mind may be the underlying concern (Hoogenhout & Malcolm-Smith, 2014). Specifically, the social information processing abilities that are inherent in a mature theory of mind may be underdeveloped (Mazza et al., 2017). Consequently, the difficulties with theory of mind that individuals with HFASD face are not related to an individual's level of intelligence (Baron-Cohen et al., 1985), but rather to insufficient social behaviour and poor communication skills (Ziv et al., 2014). Being that these social challenges in social communication are central to the experience of an individual with ASD, theory of mind impairments affect many individuals with ASD, including those who are high functioning (Hoogenhout & Malcolm-Smith, 2014). The HFASD population allows us to look specifically at the social information processing deficits without the extraneous factors that may come from comorbid diagnoses, such as global intellectual deficits. Thus, examining theory of mind deficits in individual's with HFASD allows for a clearer picture of the underlying mechanism behind the social difficulties.

Hypotheses surrounding low levels of theory of mind in HFASD. There are two major hypotheses that attempt to explain the course of the development of theory of

mind in those with ASD, which includes those with HFASD. The first is that the development of theory of mind is delayed, and the second is that it is a pervasive deficit that is seen across the lifespan (Hoogenhout & Malcolm-Smith, 2014).

The developmental delay hypothesis suggests that theory of mind abilities have the same developmental trajectory and order as in typical development, however, this occurs at a later chronological and mental age (Baron-Cohen, 1989; Holroyd & Baron-Cohen, 1993). The delay hypothesis stems from research that suggests that although most individuals with ASD fail false belief tasks, a significant amount of them are able to have success on these tests (Happe & Frith, 1996). Importantly, however, the individuals with ASD who are able to pass false belief tasks are typically older and have more developed verbal abilities than their otherwise comparable counterparts who struggle with these type of tasks (Fisher et al., 2005; Happe & Frith, 1996; Hoogenhout & Malcolm-Smith, 2014). Similar research has supported this finding, as theory of mind appears to be positively correlated with an individual's age, verbal abilities, and general reasoning abilities (Scheeren, Rosnay, Kooy, & Begeer, 2013), and consequently, improvements in theory of mind are observed when these three factors are increased. Additionally, it has been suggested that all individuals with ASD who have the verbal intellectual abilities consistent with those observed in a typically developing child that is 11 years and 9 months of age are able to pass simple false belief tasks (Happe, 1995). Therefore, this theory seems to propose that as individuals with ASD or HFASD age and their verbal and general reasoning abilities increase, their theory of mind will continue to improve in a similar developmental trajectory as those that are typically developing.

The aforementioned hypothesis has been criticized however, which lead to the opposing hypothesis of theory of mind development that focuses on a pervasive deficit (Hoogenhout & Malcolm-Smith, 2014). An example of the criticism of the delayed hypothesis can be seen in Holroyd and Baron-Cohen's (1993) study in which they found that even after 7-8 years of testing using false belief tasks, there was no statistical change in theory of mind levels. The authors found that overall, 82.4% of individuals with ASD demonstrated identical performance at the start and end of the longitudinal study (Holroyd & Baron-Cohen, 1993). They concluded that the majority of individuals with ASD will experience little development of theory of mind, as only a small minority appear to develop the equivalent of a three- to four-year-old level by adolescence, and abilities consistent with a typically developing six or seven-year-old in adulthood (Holroyd & Baron-Cohen, 1993). These results indicate that there may be a ceiling effect in theory of mind development in those with ASD and HFASD, which therefore suggests that the deficits in theory of mind may be caused by an atypical developmental trajectory in which potentials are reached in childhood, rather than a delay (Hoogenhout & Malcolm-Smith, 2014). Another argument for a developmental deficit is that theory of mind often does not follow the trajectory of development in typically developing individuals that was previously proposed, as in those with ASD it has been seen to regress or fluctuate in some individuals (Burack & Volkmar, 1992; Serra, Loth, van Geert, Hurkens, & Minderaa, 2002). Some have proposed, however, that the development of theory of mind may involve both a delayed and truncated development, as both have been supported in the literature (Hoogenhout & Malcolm-Smith, 2014; Serra et al., 2002). More specifically, perhaps not all individuals with ASD will develop an effective theory

of mind, and in the small number of individuals that do progress in the development of their theory of mind abilities, their development progress is slower and may plateau in childhood, and thus, may follow a unique developmental trajectory that differs from typically developing individuals (Hoogenhout & Malcolm-Smith, 2014).

Emotional Intelligence

Without question, intelligence plays a significant role in an individual's success throughout life. Importantly however, the intelligence quotient cannot account for all of the performance variance on measures of social and emotional functioning, such as effectively maintaining social relationships (Beldoch, 1962; Cherniss, 2010). Emotional intelligence is a stronger predictor of social success than traditional cognitive intelligence (Goleman, 2005). Salovey and Mayer (1990) initially proposed this novel type of intelligence as the ability to understand and monitor the emotions of oneself and others, and consequently use this information to inform thoughts and behaviours. The current literature regarding emotional intelligence stems from two related, but distinct approaches: the ability approach and the trait approach.

According to Mayer and Salovey (1997), ability-based emotional intelligence is the mental ability involved in information processing. Proponents of ability-based emotional intelligence suggest that there are certain performance criteria that have a level of correctness, thus the abilities in emotional intelligence can be separated into good and bad or better and worse (Brackett, Rivers, & Salovey, 2011). The branches of the ability-based model include abilities to perceive emotions, apply emotions to facilitate thought, comprehend emotions, and manage emotions (Mayer, Roberts, & Barsade, 2008; Mayer & Salovey, 1997). While distinct from other models of traditional cognitive intelligence,

the branches of emotional intelligence are interrelated, and tend to increase with age and experience (Mayer, Caruso, & Salovey, 1999). The ability-based model of intelligence involves emotion-related abilities that are typically measured in performance-based assessment (Petrides, Pita, & Kokkinaki, 2007).

The trait-based model of emotional intelligence was developed by Bar-On (1997) and is used to define and assess what has been termed the emotional quotient. Trait-based emotional intelligence, or the emotional quotient, is thought of as a collection of non-cognitive skills, capabilities, and competencies that play a role in an individual's ability to succeed in their social environment (Bar-On, 1997). Non-cognitive dispositional tendencies and perceptions of oneself are considered personality traits, rather than cognitive abilities (Petrides et al., 2007). This model classifies emotional intelligence into five general quotients: intrapersonal (self-awareness, independence, self-actualization), interpersonal (social responsibility, empathy), adaptability (problem-solving abilities, flexibility, reality-testing), stress management (stress tolerance, impulse management), and general mood (happiness, optimism) (Bar-On, 1997). Unlike ability-based emotional intelligence, which is measured through performance-based testing, trait-based emotional intelligence is a measure of emotion-related dispositions and self-perceptions examined through self-reported assessments (Petrides et al., 2007).

Social importance of emotional intelligence. Research suggests that a maturely developed emotional intelligence helps promote positive social functioning, as it allows individuals to recognize the emotional states of others and understand their unique perspective (Brackett et al., 2011). The relationship between high levels of emotional intelligence and the increased accuracy in perceiving variations in others' mood suggests

that emotion perception is essential for social adaptation (Engelberg & Sjoberg, 2004). Additionally, emotional intelligence enhances social communication skills and allows for regulation of social behaviour (Brackett et al., 2011; Goleman, 2005). The ability to react to emotional information in ways that are well-suited for the social environment is likely to assist the individual in increasing the success they experience in interpersonal relationships.

Emotional intelligence includes the ability to monitor and understand not only the emotions of others, but also one's own emotions (Salovey & Mayer, 1990). Emotional dysregulation is the failure to understand and regulate emotions appropriately, an experience that tends to be common for individuals with ASD (Samson, Phillips, Parker, Shah, Gross, & Hardan, 2014). This aspect of emotional intelligence has shown to be linked to deficits in social communication (Samson et al., 2014), as inappropriate emotional responses often have a negative impact on social interactions. Individuals with HFASD tend to have difficulty recognizing and understanding their own emotions, and they struggle even more so with understanding the emotions of others. Research suggests that individuals with ASD have significant impairments in recognizing a variety of emotions in other people through a variety of mediums, such as viewing an individual's facial expressions, hearing an emotionally-laden tone of voice, or watching a body movement that is meant to display an emotion, such as an angry body posture (e.g., clenched fists, tensed shoulders; Phillip et al., 2010). These findings suggest that underdeveloped emotional intelligence is present throughout different modalities of communication. Underdeveloped emotional recognition has also been correlated with difficulties making social judgements, such as the level of approachability others exhibit,

using facial information (Phillip et al., 2010). Thus, the challenges individuals with HFASD face when trying to understand, monitor, and regulate the emotions of themselves and others often contribute to their difficulties interacting with others. The cumulative effect of being unable to determine the emotion of a communicative partner and being unsure how to respond with appropriate emotion is likely to make social interactions especially distressing situations for these individuals.

Although there is limited evidence to suggest a significant correlation between the trait-based and ability-based models of emotional intelligence, these models both contribute important insight in efforts to predict social outcomes throughout the lifespan for typically developing individuals (Boily et al., 2017). Children with high levels of trait-based emotional intelligence were noted to have exhibited more cooperation and leadership, and less disruptive, aggressive, and dependent behaviour, as rated by their peers (Petrides et al., 2006). In young adults, higher trait-based emotional intelligence has been associated with lower levels of stress, depression, and anxiety when facing daily life pressures (Martins, Ramalho, & Morin, 2010). Trait emotional intelligence has also been related to successful social interactions (Lopes et al., 2004) and prosocial behaviours (Frederickson, Petrides, & Simmonds, 2012). Emotional intelligence is positively correlated with self-confidence, behaviour intended to benefit another person, and social competence in general (Marquez, Martin, & Brackett, 2006). Individuals with high levels of ability-based emotional intelligence were also more likely to report positive interactions with others, higher levels of extraversion, a greater competence of managing one's emotions appropriately, and ultimately more positive social outcomes in their relationships with others (Lopes, Salovey, & Straus, 2003). Furthermore, emotional

intelligence is believed to be positively associated with the amount of social support and the extent of satisfaction with social support (Ciarrochi, Chang & Bajgar, 2001).

While ability-based emotional intelligence positively affects mental health through the flexible selection of coping strategies, trait-based emotional intelligence comparatively affects the effectiveness of coping (Davis & Humphrey, 2012). This means that high levels of trait-based emotional intelligence increase the beneficial effects of active coping and decreases the effects of avoidant coping, which consequently helps reduce ASD symptomatology (Davis & Humphrey, 2012). The ability to effectively cope also has a broader impact on social interactions through more appropriate and effective responses to emotional stimuli, which can ultimately help build emotional bonds and promote as well as strengthen relationships. Overall, emotional intelligence is theoretically and empirically related to social success (Ferguson & Austin, 2010), and both trait-based and ability-based are associated with social capabilities (Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006; Mavroveli, Petrides, Rieffe, & Bakker, 2007).

Emotional intelligence in HFASD. Along with theory of mind, emotional intelligence is also directly linked to the social difficulties faced by individuals with HFASD. Many of the various aspects of emotional intelligence may be difficult for these individuals, such as perceiving and recognizing their own and others' emotions, understanding what these emotions mean, and appropriately responding to such emotions (Petrides, Hudry, Michalaria, Swami, & Sevdalis, 2011). Additionally, emotional intelligence difficulties may also relate to how individuals with HFASD engage in facial recognition. Compared to typically developing individuals who use emotional intelligence to identify emotional facial expressions (Ciarrochi et al., 2001), those with

HFASD face challenges in this area. While individuals with ASD or HFASD tend to be quite capable of expert face processing abilities (Joseph & Tanaka, 2003; Lahaie et al., 2006; Nishimura, Rutherford, & Maurer, 2008), they struggle with inferring emotional components of faces, such as recognizing that a clenched mouth and furrowed eyebrows may suggest anger, especially as the emotional inferences increase in complexity (Walsh, Creighton, & Rutherford, 2016). As mentioned above, these individuals also have difficulties identifying emotions by viewing body movement and vocal tone (Philip et al., 2010), suggesting that there may be a generalized impairment in emotion recognition.

When examining the challenges these individuals face in understanding and appropriately responding to emotions, it is helpful to look at the previously described trait and ability models of emotional intelligence. The trait and ability models both offer distinct conceptualizations of emotional intelligence, and as such, both can be applied to those with HFASD in different ways. Ability emotional intelligence is thought to be a mental ability and involved in information processing, and thus may relate to how individuals with HFASD cognitively manage emotional content and how they reason with emotional information in social situations (Mayer & Salovey, 1997; Montgomery et al., 2010). Trait emotional intelligence, conversely, is related to one's personality and may relate to how individuals with HFASD perceive their general performance and competencies in social interaction (Bar-On, 1997; Montgomery et al., 2010). Individuals with HFASD struggle significantly with trait emotional intelligence, however, their ability emotional intelligence levels remain largely intact (Montgomery et al., 2010; Petrides et al., 2011). Thus, those with HFASD showed impairment in emotional intelligence characteristics and performance in real-life emotion-laden communication,

yet were able to process emotional information (Montgomery et al., 2010; Montgomery et al., 2012). Emotional intelligence is distinct from an individual's intelligence, as individuals with HFASD who have largely intact language and cognitive abilities still struggle with understanding and using emotions (Petrides et al., 2011). Therefore, individuals with HFASD may be able to use their cognitive abilities as a compensatory strategy to decode and reason with emotions and how they relate to behaviour, as they have difficulty making sense of emotional processing. They face challenges, however, when it comes to their actual social interactions that involve applying their knowledge to these real-life emotional exchanges (Montgomery et al., 2012). As a result, early interventions aimed at improving these individual's trait emotional intelligence could have lasting, positive outcomes in the lives of individuals with HFASD. These interventions are crucial to bridge the gap between social and emotional knowledge, and the practical abilities and skills required to apply this knowledge, and to apply it flexibly to improve social outcomes for individuals with HFASD. Understanding the difference in trait emotional intelligence in those with HFASD relative to their typically developing peers allows researchers and practitioners a more comprehensive understanding of how early intervention can ultimately promote increased positive social outcomes that also exhibit applicability across home, school, and community settings, as well as longevity throughout the life span.

Theory of mind and emotional intelligence. Even though theory of mind and emotional intelligence both contribute to successful social interactions through an understanding of the thoughts, feelings, and ultimately perspectives of others, they are distinct constructs (Blair, 2002). As an example, the conceptual link between theory of

mind and emotional intelligence can be seen in emotion perception, emotional understanding and managing the emotions of others (Ferguson & Austin, 2010). Correlational studies have supported this, as theory of mind and emotional intelligence have shown to have a positive statistical relationship (Barlow, Qualter, & Styliano, 2010). Further, these concepts are also positively associated with increased social competence in typically developing individuals (Liddle & Nettle, 2006). However, the differences between these concepts can be seen when comparing theory of mind to the emotional intelligence components of self-esteem, emotional regulation of oneself, and motivation (Ferguson & Austin, 2010). As mentioned previously, theory of mind is related to understanding the mental states of others (Flavell, 2004), whereas emotional intelligence not only involves similar interpersonal abilities, but also intrapersonal aspects as well, such as regulating one's own emotions, managing one's stress levels, and one's general mood (Bar-On, 1997). Therefore, although both of these concepts include recognizing emotions in other individuals, emotional intelligence may have a greater application to how an individual actually functions in an emotional context. For example, an individual may have satisfactory abilities in controlling his or her own emotions, but that does not mean that he or she has the ability to understand the emotions and mental states of others. This example may be relevant to individuals with HFASD, as they may have higher functioning emotional intelligence than theory of mind (Blair, 2002). This highlights the social difficulties that those with HFASD face. Additionally, theory of mind has aspects that are not related to emotional intelligence, as this ability involves not only understanding and inferring the emotions of others, but also includes all other types of mental states, such as desires, beliefs, and intentions (Ferguson & Austin, 2010). An

example of the disconnect between these concepts can be seen in individuals with psychopathy, as they often have significant deficits in emotional intelligence, however their theory of mind is much more intact (Dolan & Fullam, 2004; Richell et al., 2003). This may affect their ability to understand their own and others emotions, even though they may be able to predict other mental states of others. Thus, theory of mind and emotional intelligence often overlap, but it is not necessary to have one in order to have the other (Blair, 2002).

Social Stress in HFASD

The difficulties that individuals with HFASD face in social settings not only contribute to poor social experiences and outcomes, but also to chronic, significant levels of social stress that continuously impede their social abilities. Higher levels of cognitive intelligence appear to negatively impact the level of social stress, as it often provides increased insight into their social challenges (Frith, 2004). Unlike children with ASD who often overestimate their social competence, children with HFASD tend to be aware of the difficulties they face and see themselves as less socially competent (Vickerstaff et al., 2007). This ability to perceive their own social difficulties often causes significant comorbid emotional struggles, such as lower happiness and self-esteem (Petrides et al., 2011).

Compared to typically developing individuals, those with HFASD experience a higher level of perceived stress, as well as significantly more stressful life events (Bishop-Fitzpatrick, Minshew, Mazefsky, & Eack, 2017). An increased level of stress in general has negative consequences for these individuals, as it has shown to be significantly associated with social disability (Bishop-Fitzpatrick et al., 2017). Increased

stress also causes physiological reactions, such as systolic blood pressure reactivity (Bishop-Fitzpatrick et al., 2017). Unfortunately for those with HFASD, stress may precipitate and/or exacerbate the core symptoms of HFASD (Khor, Melvin, Reid & Gray, 2014). Additionally, high stress levels have been associated with symptoms of anxiety in adults with HFASD (Gillott & Standen, 2007). Thus, it seems that these individuals are at a higher risk of experiencing significant levels of long-term stress, potentially related, at least in part, to their increased insight into their social deficits relative to other individuals on the spectrum. Additionally, they are also further disadvantaged by this heightened stress exacerbating their social challenges, consequently leaving them at a high risk to develop a comorbid mood disorder, such as anxiety or depression. Interventions targeting stress management in adolescence may improve the long-term social functioning of people with HFASD, as well as their overall quality of life.

Impact of Theory of Mind and Emotional Intelligence on Social Stress in those with HFASD. Many interventions aimed at improving the social abilities of children and adolescents with HFASD focus on increasing their theory of mind. Theory of mind is targeted in this population based on previous findings that suggest increasing theory of mind in typically developing children leads to greater success in social situations (Ferguson & Austin, 2010; Hofmann, 2016; Liddle & Nettle, 2006). However, developing a theory of mind may not aid the development of social skills in individuals who have HFASD and may in fact hinder this process. It appears that increasing theory of mind abilities while emotional intelligence remains underdeveloped predicts high levels of social stress in individuals with HFASD (Montgomery et al., 2012). Taken together, impaired theory of mind and low emotional intelligence predict about a third of the social

stress experienced by individuals with HFASD (Montgomery et al., 2012). Thus, it appears that when these abilities are underdeveloped, it may lead to social stress in those with HFASD. However, if theory of mind is further developed without concurrently further developing emotional intelligence, social stress is also significantly increased. It is therefore speculated that if these individuals on the autism spectrum are not exposed to interventions that both target theory of mind and emotional intelligence concurrently, they may be at a higher risk of experiencing significant social stress, and ultimately predisposed to a higher risk of developing a comorbid disorder.

Effective social communication requires more than the cognitive components of theory of mind. Effective socializing requires both being able to understand what is happening in the situation you are in, while simultaneously using one's emotional intelligence skills to appropriately respond (Petrides et al., 2011). As discussed above, individuals with HFASD have a higher level of the cognitive aspect of communication relative to their ability to apply this knowledge and ultimately experience success in social situations (Petrides et al., 2011). The cognitive component of emotional interaction can be comparable to theory of mind within these individuals, as it involves a cognitive understanding of how another person is feeling or thinking. Thus, increasing one's cognitive understanding of other's thoughts and feelings without also increasing the practical knowledge and skills regarding the application of the increased understanding of others, may unfortunately increase social stress. These individuals may better understand what is occurring in the social situation, but not know how to appropriately respond or react, as they may not have the social or emotional skills to do so. This combination of knowledge without the social and emotional skills to respond can be extremely stressful,

particularly when surrounded by peers (Humphrey & Lewis, 2008). The combination of a high level of theory of mind and a low level of emotional intelligence may allow the individual with HFASD to better recognize when their peers have negative perceptions and evaluations of them. Furthermore, the stress is amplified in these individuals without the ability to appropriately and successfully respond to these negative evaluations.

Amplified stress and lack of ability to respond can create a cycle where the individual knows others are negatively appraising them, causing them to react in a socially inappropriate way (Khor et al., 2014), which subsequently causes their peers to negatively evaluate them further. This unfortunate sequence of events highlights the immense importance of providing interventions that not only address theory of mind in individuals with HFASD, but concurrently aim to further develop emotional intelligence as well, so these individuals can apply their increased understanding of other's perspective into how they respond, with the ultimate aim being to increase successful social communication.

Elevated social stress levels may affect social interventions for those with HFASD. The elevated levels of stress in those with HFASD may compromise their capacity to employ the strategies that they are learning in interventions (Bishop-Fitzpatrick et al., 2017), such as those that attempt to heighten theory of mind and emotional intelligence. Therefore, these interventions that are designed to lower stress may not only unintentionally raise it, but also may be compounded by the already present level of stress that is common in this population. Heightened stress levels are likely to decrease the efficacy of interventions and may ultimately heighten social stress levels even further (Bishop-Fitzpatrick et al., 2017).

In sum, current interventions for individuals with HFASD are aimed at increasing theory of mind with the goal of increasing social competence, and thus decreasing social stress. Importantly however, the relationship between theory of mind and social competence and stress is not fully understood in individuals with HFASD. It appears that methods to increase social competence in those that are typically developing are being used with those with HFASD without a comprehensive understanding of how their needs may differ from those in typically developing populations. It is understood that those with HFASD experience a deficit in theory of mind and emotional intelligence (Baron-Cohen et al., 1985; Boily et al., 2017). Previous research has shown that interventions aimed at increasing these concepts separately in typically developing individuals are successful in increasing social competence (Ferguson & Austin, 2010), so this is being applied to HFASD individuals as well. The current interventions that target theory of mind without concurrently improving emotional intelligence, however, may not be the most effective way to improve outcomes for those with HFASD, and as mentioned above, may unintentionally worsen their social experiences by increasing social stress. Examining and comparing the interaction between theory of mind, emotional intelligence, and social stress in those with HFASD and typically developing individuals allows for an increased understanding of the efficacy of current interventions, and more importantly, ways in which researchers and practitioners can improve these interventions.

Chapter Three: Methods

The data used in the current study was previously collected through a larger tri-university collaboration conducted through the University of Calgary, University of Saskatchewan, and University of Manitoba. This broad study had the overarching goal of

investigating the emotional and executive functioning of late adolescents with HFASD as compared to typically developing individuals, and to consequently use this information to help these individuals transition into adulthood (Brady, 2011). This original study was approved by the University of Saskatchewan Behavioural Research Ethics Board, the University of Manitoba Psychology/Sociology Research Ethics Board, and the University of Calgary Conjoint Faculties Research Ethics Board in the months of May and June of 2006. Use of the aggregate data from the original study for the purpose of this current study was approved by the Human Subjects Research Committee at the University of Lethbridge based on the anonymous nature of the data collected in the original study. The data from the previous study has been utilized in a unique and new way to examine theory of mind, emotional intelligence, and social stress in those with Asperger Syndrome/now HFASD. During data collection, Asperger Syndrome was still considered a disorder within the DSM-IV, however, these individuals are now considered as falling into the newer broader category of ASD (APA, 2000; APA, 2013). The individuals that participated in this study would now be reclassified as having ASD with the specifiers of without intellectual or language impairments, also known as HFASD (APA, 2013). Thus, this research refers to the participants as having HFASD throughout this study, as it is the current terminology.

Participants

Participants with HFASD were recruited from schools, university clinics, service organization, and mental health settings in Alberta and Manitoba as part of the broader project. To understand how the variables of theory of mind, emotional intelligence, and social stress interact in those with HFASD, a typically developing control group was used

for comparison. Control group participants were recruited through advertisements in local newspapers, newsletters, and posters in various service centers and in university campuses, and by word of mouth. There were 35 participants with HFASD recruited that met inclusion criteria, described below, who were invited to participate in the study. The participants ranged in age from 16.3-21.6 years ($M = 18.8$, $SD = 1.5$). The control group of age- and sex-matched typically developing individuals also had 35 individuals ranging from 16.0 to 21.6 years ($M = 18.9$, $SD = 1.5$). The male to female ratio for this study was 3:1, which is similar to the ratio's reported in commonly cited work on similar information (Ehlers & Gillberg, 1993). Individuals with comorbid conditions were not excluded from participating unless their co-existing condition interfered with their ability to complete study tasks (e.g., selective mutism). All research participants provided their informed consent prior to being included in the study.

The inclusionary criteria for this study covered five important areas. The first criterion was a clinical diagnosis. To participate in this study, clinical participants for the HFASD group had to have received a diagnosis of Asperger Syndrome (HFASD) from a medical doctor, psychologist or psychiatrist. It was required that participants provide documentation of this diagnosis, the name of the professional who provided the diagnosis, and information regarding their developmental history. The next inclusionary criterion was validation of diagnosis. Participants from the HFASD group were required to produce a classification within the high to very high ranges of likelihood of having Asperger Syndrome on the Krug Asperger Disorder Index (KADI; Krug & Arick, 2003). This is a measure made to aid in the distinction between individuals with AS/high-functioning autism. As the data collection was completed prior to the diagnostic change

in the current fifth edition of the DSM (APA, 2013), Asperger Syndrome is no longer separate from other forms of HFASD. This criterion is still relevant, however, as it helps to assess not only intellectual abilities, but also typically-developed language abilities in early childhood. Additionally, it also helps to validate social and emotional challenges specific to those on the autism spectrum, relative to other clinical populations who also struggle socially and emotionally. The next inclusionary criterion was intelligence. The HFASD group and the typically developing group participants in this study were required to demonstrate verbal IQ, performance/visual IQ, and full-scale intelligence in the average or higher ranges on the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). This was meant to ensure the sample met the HFASD criterion of no impairment in intellectual abilities. This criterion was important to ensure that the variables were not affected below average intellectual ability. The control participants were not matched to the HFASD participants on this criterion, as research has shown that individuals with HFASD often demonstrate an uneven and uncommon display of intellectual abilities. The purpose of the control group was to provide comparison of typically developing individuals who do not display ASD intellectual profiles. Next, typical early language development was considered a required criterion for inclusion in the study. This meant that clinical and control participants must not have experienced a language delay in early childhood. Finally, neurological integrity was a criterion to participate in this study. Thus, all participants must not have had a history of head injury or diagnosis of neurologically-based medical condition (such as a seizure disorder) in order to participate.

Materials

In order to address the two research questions, data was statistically assessed from three measures completed by those with HFASD.

Intelligence. To ensure that participants did not have underdeveloped intellectual abilities, the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) was used. This is an appropriate intelligence test for individuals between the ages eight to 89 (Wechsler, 1999). The WASI includes four subscales: vocabulary, similarities, block design, and matrix reasoning (Wechsler, 1999). The psychometric properties of this assessment are considered extremely good (Montgomery et al., 2010). Stability coefficients indicate high reliability, ranging from .93 to .92 for children and adults respectively (Saklofske et al., 2000; Wechsler, 1999). To highlight the validity of the WASI, research has shown high correlations between other highly validated intelligence assessments, such as the Wechsler Intelligence Scale for Children, 3rd Edition (WISC-III; Wechsler, 1991) and the Wechsler Adult Intelligence Scale, 3rd Edition (WAIS-III; Saklofske et al., 2000; Wechsler, 1997; Wechsler, 1999).

Autism Spectrum Symptomatology. The Krug Asperger Disorder Index (KADI; Krug & Arick, 2003) was used to assess individuals for ASD. This norm referenced assessment (ages six to 21) contains 32 items that rate the individual's behaviour and can be completed by close friends, parents, or relatives of the individual (Krug & Arick, 2003). The internal reliability of the KADI is high at .89, has shown 90% agreement on measures of inter-rater reliability, and validity of .94 for specificity, .78 for sensitivity, and .83 for predictive power (Krug & Arick, 2003).

Autism Symptomatology Severity. The Gilliam Autism Rating Scale-Second Edition (GARS-2: Gilliam, 2006) was also used to screen for ASD. This screening tool contains 42 items and was designed for use with individuals between the ages of 3 to 22 (Gilliam, 2006). The purpose of this assessment is to distinguish between those with ASD and those who are typically developing or have severe behavioural disorders (Montgomery, Newton, & Smith, 2006). This tool reflects the DSM-IV-TR (APA, 2000) understanding of ASD and provides an index of symptom severity. Scores assess stereotyped behaviours, communication, and social interaction (Gilliam, 2006). The internal consistency of the GARS-2 is high (Montgomery et al., 2006), test-retest is significant, and this item appears to be valid comparably to the DSM-IV-TR criteria of ASD (Brady, 2011).

Theory of mind. To measure theory of mind, participants completed the Reading the Mind in the Eyes Test, Revised Version (Eyes Test Revised) (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). This assessment is an advanced theory of mind test that contains 36 items (Baron-Cohen et al., 2001). Participants are asked to examine black and white pictures of the eye area of a face and choose one of four affectual words that best describes the emotion displayed by the eyes (Baron-Cohen et al., 2001). This assessment of theory of mind offers a thorough exploration of theory of mind through assessing the cognitive capability of the individual, compared to self-report questionnaires that may only examine the self-perception/evaluation (Baron-Cohen et al., 2015). This instrument has good reliability and validity (Fernandez-Abascal, Cabello, Fernandez-Berrocal, & Baron-Cohen, 2013; Vallante et al., 2013).

Emotional Intelligence. While trait-based and ability-based conceptions of emotional intelligence appear to be similar, correctional analyses have demonstrated that the conceptual overlap between the two constructs is quite minimal (O'Connor & Little, 2003; Warwick & Nettelbeck, 2004). Comparative analyses have suggested that, although the trait-based model is quite broad, it has good predictive and explanatory value across situations and has a stronger empirical basis than ability-based model (Montgomery et al., 2012; Petrides, Sangareau, Furnham, & Frederickson, 2006). Thus, this study uses the trait-based model of emotional intelligence to measure this concept. To measure trait emotional intelligence, individuals completed the Bar-On Emotional Quotient Inventory-Short Form (Bar-On EQ-i:S; Bar-On, 2002). This assessment measures the key aspects that define emotional intelligence behaviour in individuals 16 years of age or older (Bar-On, 2002). This is the brief version of the BarOn EQ:I (Bar-On, 1997). This assessment requires participants to rate themselves on a five-point Likert scale that ranges from “very seldom true of me” to “very often true of me” on 51 items (Bar-On, 1997). The BarOn EQ-i:S assesses four main areas of trait emotional intelligence. The first area it assesses is the intrapersonal emotional quotient, which focuses on self-awareness and self-expression (Bar-On, 2002). Next, it examines interpersonal emotional quotient, which includes interpersonal relationships and an individual’s social awareness (Bar-On, 2002). The third area is stress management emotional quotient, which measures emotional regulation and management (Bar-On, 2002). Finally, this assessment measures adaptability emotional quotient, which includes change management abilities (Bar-On, 2002). Raw scores from these areas are then converted to norm-referenced standard scores ($M = 100$, $SD = 15$). Internal consistency for this assessment is acceptable, ranging

from .70 to .80 (Bar-On, 2002). Additionally, the Bar-On EQ:I and the BarOn EQ-i:S have strong correlations, from .73 to .97, which show construct validity in the short version (Bar-On, 2002).

Social Stress. To assess social stress, participants were asked to complete the Behavior Assessment System for Children (2nd ed.; BASC-2; Reynolds & Kamphaus, 2004) The BASC-2 is a multi-dimensional inventory to assess the behaviour and self-perceptions of individuals (Reynolds & Kamphaus, 2004). This assessment was designed for use with individuals ranging from two years old to 25 years old. The BASC-2 includes three rating forms, one to be filled out by the individual, the parent, and the teacher (Reynolds & Kamphaus, 2004). This is beneficial, as it provides multi-source information about the individual's behavioural and affective functioning throughout various situations and contexts (Montgomery et al., 2010). There are five components to the BASC-2 which stem from these rating forms. This includes the teacher rating scales (TRS), the parent rating scales (PRS), the self-report of personality (SRP), the structured developmental history (SDH) form, and the student observation system (SOS) (Reynolds & Kamphaus, 2004). For this study, the Social Stress scale from the SRP was used. The BASC-2 has moderate to good reliability and validity (Reynolds & Kamphaus, 2004).

Procedures

The individuals who were interested in participating in this research study were mailed an information package that outlined the general information surrounding this project, consent forms for the participants and their parents, including assent forms, and the Participant Information: Developmental History questionnaire for parents to complete. Parents of the participants with HFASD were also asked to complete the

KADI, which was used to determine if participants met the inclusionary criteria. Once the information was completed and returned to the researchers, the parents of minor participants and the participants that were over the age of majority were contacted to schedule a time for participation in the research study. When participants arrived at the research session, they were first given an overview of the research session, a debriefing about the measures of the study, a reminder that participation was voluntary and that they could withdraw at any time without consequence, and finally a confirmation of assent or consent was obtained. Participants from both the HFASD group and the control group then completed a battery of measures in one session assessing ASD symptomatology, cognitive intelligence, emotional intelligence, executive function, resiliency and behaviour as part of the large tri-university study. The participants who completed the research tasks of this study were compensated for their time with a fifty-dollar gift certificate. Those that did not meet inclusionary criteria were thanked for their time and entered into a draw for a prize, which included a pair of binoculars and a USB thumb drive.

Method of Analysis

To examine the research question, a multiple linear regression was conducted to assess if the independent variables predicted the dependent variable. A multiple linear regression analysis evaluates the correlations and interactions between multiple interval/ratio predictor variables on an interval/ratio criterion variable and is used when the correlations are hypothesized to be linear (Gall, Gall, & Borg, 2007). This type of analysis is popular due to its versatility and amount of information it reveals regarding the relationships among variables, such as both the magnitude and statistical significance

of relationships (Gall et al., 2007). In this study, the independent variables were the levels of theory of mind and emotional intelligence and the dependent variable was social stress levels. The following regression equation was used: $\hat{Y} = b_1X_1 + b_2X_2 + C$. In this equation, Y is the level of social stress, b_1 and b_2 are the regression weights (a multiplier term added to each independent variable to maximize predictive value of the variables) of theory of mind and emotional intelligence respectively, and X_1 and X_2 are the scores of the independent variables, thus levels of theory of mind and emotional intelligence respectively. Lastly, C is the constant term (Gall et al., 2007). This was completed with the data for the group with HFASD, as well as the data from the typically developing group.

The independent variables were assessed by what they add to the prediction of the social stress that is unique from the predictability afforded by the other independent variables (Gall et al., 2007). Additionally, an F-test was utilized to evaluate if both independent variables collectively predicted the dependent variable. The coefficient of determination (R^2) was also calculated and used to assess the amount of variance in social stress that is explained by an individual's independent variable or a combination of the independent variables (Gall et al., 2007).

The assumptions of multiple regression were also assessed. The first assumption is that variables are normally distributed. The importance of this is that non-normally distributed variables, such as those that are highly skewed or have extreme outliers, may distort the relationships between variables and thus the significance of the tests (Osbourne & Waters, 2002). The next assumption is that the independent and dependent variables have a linear relationship, as this type of statistical analysis can only accurately

estimate relationships if they are linear in nature (Osbourne & Waters, 2002). Another assumption of multiple regression analysis is that the variables are measured without error and are reliable (Osbourne & Waters, 2002). This assumption is important because in the situation that variables are unreliably measured, relationships may be underestimated which increases the risk of committing a Type II error (Osbourne & Waters, 2002). The final assumption is of homoscedasticity, which means that the variance of errors is equal across all levels of the independent variable (Osbourne & Waters, 2002). When the variance of error is scattered differently around the various values of the independent variable, this indicates heteroscedasticity which increases the possibility of a Type I error (Osbourne & Waters, 2002). Checking all of these assumptions will allow the researcher to ensure they are avoiding a Type I and/or II error.

A one-way multivariate analysis of variance (MANOVA) was used to identify whether diagnosis (HFASD or none) affected an individual's social stress level, emotional intelligence, and theory of mind abilities. Where significant multivariate main effects and interactions were found, univariate analysis of variance (ANOVA) was used to identify if the dependent variables contributed to the significant multivariate result. For all hypotheses, statistical tests were set at an alpha probability of .05. This ensures reasonable assurance against Type I errors as well as consistency in producing power statistics for all the tests.

Chapter Four: Results

The purpose of the present study was to expand on previous preliminary findings and to investigate the social stress levels of individuals with HFASD, relative to their typically developing peers. This chapter first describes the findings of the study and its

primary research questions, including an analysis of the descriptive variables, a multiple regression analysis, and the MANOVA. The following hypotheses were tested in the present study to answer the two research questions:

- 1) Theory of mind will be directly related to social stress levels in individuals with HFASD. Emotional intelligence will be inversely related to the social stress levels in individuals with HFASD.

Theory of mind and emotional intelligence measure scores will be inversely related to social stress levels in typically developing individuals.

- 2) Individuals with HFASD will have significantly differently levels of theory of mind, emotional intelligence, and social stress scores than those that are typically developing.

Individuals with HFASD will score lower on the theory of mind and emotional intelligence scales and higher on the social stress scores compared to their typically developing peers.

Data Screening

To ensure all values were entered correctly, all data entry was checked by two researchers simultaneously during the initial study. It appeared that some data was missing during this check, however, it was available and subsequently entered by both researchers. Following this, all data was rechecked by both researchers independently. The data set was also checked for outliers and/or mistyped data inputs by analysis of scatterplots. Analysis of the data was originally conducted using SPSS® Statistics, version 19 (IBM, 2010) and subsequently analyzed during this current study using SPSS® Statistics, version 25 (IBM, 2017).

Missing Data

During the informed consent procedures of the original study, participants were informed that they were free to decline completion of particular tasks at any time without penalty as per the involved ethics boards. Some participants chose not to/or could not nominate a teacher to complete the BASC-2 forms. Thus, 13 of the 25 BASC-2 TRS forms were returned, leaving nearly half incomplete. It was speculated in the original study that due to the age range of the participants (16-21), many participants were not in a formal educational or training environment where a teacher would be present at the time of participation. This current study however did not analyze the teacher component of the BASC-2, as it was deemed irrelevant to the dependent variable. Additionally, one parent chose not to complete the BASC-2 parent report form due to time constraints. The missing data was not a concern for this current study, as both the teacher and parent reports were not being analyzed.

Distributions

The data was examined for normality and outliers. To gain insight into whether the distributions were sufficiently normal, skewness and kurtosis values were examined. Skewness is a measure of the symmetry of the distribution, whereas kurtosis is a measurement of how peaked the distribution is (Tabachnik & Fidell, 2001). The relevant skewness and kurtosis values are presented in Table 1.

Table 1

Skewness and Kurtosis Values

Measure	Skewness	Kurtosis
1) Krug Asperger Disorder Index Composite	.15	-1.87
2) GARS2 Autism Index	-.25	-.69
3) WASI Full Scale IQ	.18	-.14
4) BarOn EQ-i:S Total EQ Score	-.23	-.66
5) BASC-2 SRP (Social Stress)	1.44 (.178)	3.71 (.019)
6) Eyes Test Revised	-.15	-.82

To determine that the distribution is normal, the skewness and kurtosis values would have to fall somewhere between ± 2 (George & Mallery, 2003; Tabachnick & Fidell, 2007). Values of zero would suggest that skewness and kurtosis are perfectly normal (George & Mallery, 2003). Values between ± 1 are considered excellent and the remaining values that fall within ± 2 are considered acceptable (George & Mallery, 2003). As the values in Table 1 show, the majority of the distributions had excellent skewness and kurtosis values. Thus, this suggests that these distributions were sufficiently normal. It appears, however, that the distributions of the scores on the BASC-2 SRP Social Stress subscales had moderate positive values, which suggests the distributions were slightly peaked. As suggested by Tabachnik and Fidell (2007), researchers of the original study conducted an examination of the distributions for outliers, which included replacing outliers with the mean group score which is meant to

produce a more normal distribution. The outlier, which was more than 2 standard deviations from the group mean, was replaced. Only one outlier was replaced for this scale. The new values after outliers were replaced are reported in Table 1 in parenthesis beside the original values and are now considered excellent values.

Descriptive Statistics

Descriptive statistics were calculated for all variables relevant to this study. The descriptive statistics for the HFASD group and the typically developing control group are listed in Table 2, including mean scores, standard deviations, minimum and maximum values, and sample size of each of the variables.

Table 2

Descriptive Statistics

Variable (Sample Size)	<i>M (SD)</i>	Minimum Value	Maximum Value
1) Krug Asperger Disorder Index			
HFASD Group (33)	90.73 (15.25)	45	118
Control Group (33)	0 (0)	0	0
2) GARS-2 Autism Index			
HFASD Group (34)	77.18 (17.80)	43	139
Control Group (33)	24.58 (26.52)	0	70
3) WASI FSIQ			
HFASD Group (35)	112.06 (11.37)	88	138
Control Group (35)	110.20 (8.66)	93	124
4) BarOn Emotion Quotient Inventory			
HFASD Group (35)	83.86 (15.05)	56	116
Control Group (35)	100.26 (12.55)	62	119
5) BASC-2 SRP (Social Stress)			
HFASD Group (35)	54.83 (10.66)	38	92
Control Group (35)	46.66 (6.60)	36	65
6) Eyes Test Revised			
HFASD Group (35)	24.86 (3.64)	18	32
Control Group (35)	26.74 (3.28)	19	31

Research Question One

A multiple regression analysis was conducted to examine to what extent increases in performances on an advanced theory of mind test and on an emotional intelligence inventory affect the social stress levels of adolescents with HFASD and those who are typically developing.

A multiple linear regression was calculated to predict social stress based on emotional intelligence and theory of mind in both groups. Collinearity diagnostics were within acceptable guidelines for both groups. A significant regression was found in the group with HFASD ($F(2,32) = 7.02, p < .01$), with an R^2 of .31. The regression equation for the participants' predicted social stress is equal to $68.44 + .62$ (theory of mind) $-.35$ (emotional intelligence), where theory of mind is coded or measured as points on the Eyes Test Revised scale and emotional intelligence is measured as points on the BarOn Emotional Quotient Inventory Short Form. The sample multiple correlation coefficient was .55, indicating that approximately 31% of the variance of social stress in the HFASD sample can be accounted for by the linear combination of emotional intelligence and theory of mind.

In Table 3, indices were included to indicate the relative strength of the individual predictors in the HFASD group. In the HFASD group, the bivariate correlations between the BarOn Emotional Quotient Inventory and the Social Stress measure were negative, suggesting they are inversely related, which supports the original hypothesis. This correlation was statistically significant, $p < .05$. The Eyes Test Revised had a positive relationship, which supported the original hypothesis, however the results were not statistically significant, $p > .05$. The BarOn Emotional Quotient Inventory alone predicts 26% ($-.510 = .26$) of the variance of social stress, while the Eyes Test revised only contributed an additional 5% of the variance ($31\% - 26\% = 5\%$). Thus, it is tempting to conclude that the only useful predictor of social stress in the HFASD group is emotional intelligence as measured by the BarOn Emotional Quotient Inventory.

Table 3

The Bivariate and Partial Correlations of the Predictors with Social Stress in the HFASD group

Predictors	Correlations between each predictor and the social stress index	Correlations between each predictor and the social stress index controlling for all other predictors
Bar-On Emotional Quotient Inventory	-.51*	-.50*
Eyes Test Revised	.26	.25

* $p < .05$

A multiple linear regression was calculated to predict social stress based on emotional intelligence and theory of mind in the control group as well. A significant regression equation was found ($F(2,32) = 16.76, p < .01$), with an R^2 of .51. The regression equation for the participants' predicted social stress is equal to $89.84 - .37$ (emotional intelligence) - $.23$ (theory of mind) where theory of mind is coded or measured as points on the Eyes Test Revised scale and emotional intelligence is measured as points on the BarOn Emotional Quotient Inventory Short Form. The sample multiple correlation coefficient was .72, indicating that approximately 51% of the variance of social stress in the control group can be accounted for by linear combination of emotional intelligence and theory of mind.

In Table 4, indices are included indicating the relative strength of the individual predictors in the control group. In the control group, the bivariate correlations between the BarOn Emotional Quotient Inventory and the Social Stress measure were negative, suggesting they are inversely related, which aligned with the original hypothesis. This

correlation was statistically significant, $p < .05$. The Eyes Test Revised had a negative relationship, which supported the original hypothesis, however the results were not statistically significant. The BarOn Emotional Quotient Inventory alone predicts 50% ($.706^2 = .50$) of the variance of social stress, while the Eyes Test revised only contributed an additional 1% of the variance ($51\% - 50\% = 1\%$). Thus, aligning with the results from the HFASD group, it appears that the only useful predictor of social stress in the control group is the BarOn Emotional Quotient Inventory.

Table 4

The Bivariate and Partial Correlations of the Predictors with Social Stress in the Control Group

Predictors	Correlations between each predictor and the social stress index	Correlations between each predictor and the social stress index controlling for all other predictors
Bar-On Emotional Quotient Inventory	-.71*	-.71*
Eyes Test Revised	-.15	-.16

* $p < .005$

Research Question Two

A one-way MANOVA was used to investigate how the scores on an advanced theory of mind test and on an emotional intelligence inventory affect social stress levels differently for individuals with HFASD when compared to their age- and sex-matched typically developing peers.

A MANOVA was conducted to test the hypothesis that there would be one or more mean differences between the HFASD group and the typically developing group on their emotional intelligence, theory of mind, and social stress inventory scores. Results of the MANOVA with three dependent variables (emotional intelligence, theory of mind, and social stress) show a significant main effect size for differences between groups separated by whether or not there was a diagnoses of HFASD, $F(3,66) = 10.66, p < .05$, effect size = .33, power = 1.00. Thus, being that the multivariate effect size was estimated at .33, it is implied that 33% of the variance in the dependent variables was accounted for by presence of a HFASD diagnosis.

With respect to univariate main effects, emotional intelligence was significant ($p < .05$) with diagnosis in groups, $F(1,68) = 24.5$, effect size = .27, power = 1.00. The social stress scale was significant ($p < .05$) with diagnosis in groups, $F(1,68) = 14.87$, effect size = .18, power = 97. And finally, the theory of mind test was also significant ($p < .05$), thus groups differed significantly on this inventory, $F(1, 68) = 5.19$, effect size = .07, power = .61. For a visual representation of the means and standard deviations of these variables between groups, see Table 2.

Chapter 5: Discussion

Within this section, a summary of all the major findings from this study are presented, paired with a discussion of relevant previous literature findings. The aims of this study were to investigate how emotional intelligence, theory of mind levels, and social stress manifest in those with HFASD and those who are typically developing.

Interpretation of results

The first research question was to examine the extent that increases in performance on an advanced theory of mind test and an emotional intelligence inventory affect the social stress levels of adolescents with HFASD. As mentioned above, it was hypothesized that when theory of mind increases, there may be an increase in social stress; however, concurrently increasing emotional intelligence may reduce social stress. The results of this study suggest these hypotheses are correct. The combination of high-performance levels on a theory of mind measure and poor performance on an emotional intelligence inventory significantly predicted higher levels of social stress. This unique combination of theory of mind and emotional intelligence accounted for 31% of the variance of social stress in the HFASD sample. This finding was confirmed when examining theory of mind and emotional intelligence as individual predictors of social stress. Importantly however, the examination of the effect of variables independently indicates that theory of mind does not have a statistically significant relationship with social stress; emotional intelligence is independently responsible for the majority of the variance in social stress.

After determining the relationship between these variables in the HFASD group, the typically developing control group was examined. It was originally predicted that unlike the HFASD group, theory of mind and emotional intelligence scores would both decrease social stress levels in the control group. The results of this study suggest that this hypothesis is correct, as both theory of mind and emotional intelligence had a significant negative relationship with social stress. Thus, as an individual's theory of mind and emotional intelligence performance increased, it predicted a decrease in social stress. Taken together, theory of mind and emotional intelligence were responsible for

51% of the variance in social stress in this group. As also noted in the analysis of participants with HFASD, theory of mind did not have a statistically significant independent relationship to social stress in this group. Thus, emotional intelligence, which was significantly related to social stress, accounted for almost all of the previously listed variance in social stress.

Taken together, the results from both groups suggest that theory of mind and emotional intelligence had an effect on social stress levels. The directions of the relationships matched predictions, as high emotional intelligence predicted low social stress in both groups, whereas theory of mind increased social stress and decreased social stress in the HFASD group and control group, respectively. However, the insignificant effect of theory of mind on social stress was not hypothesized. It was speculated that theory of mind would significantly predict social stress in both groups. This hypothesis was based on previous research that suggests theory of mind can impact one's level of social awareness and functioning (Hadwin et al., 1997; Hofmann et al., 2016), which may be directly related to the amount of stress experienced in a social situation (Frith, 2004; Bellini, 2004). One potential reason theory of mind did not significantly predict social stress independently could be a lack of a direct relationship between these two concepts. Previous research has found that while some benefits occur during theory of mind focused interventions in ASD populations, there is a lack of skills maintained, generalizability to other settings, or developmental effects of related skills (Fletcher-Watson, McConnel, Manola, & McConachie, 2014). Thus, these interventions have limited effects, including a lack of effect ultimately, on one's stress levels. Nevertheless, when taken together, theory of mind and emotional intelligence did significantly predict

social stress, which suggests theory of mind is related to social stress when paired with emotional intelligence, even if insignificant on its own. This study provides preliminary evidence to suggest that the relationship between theory of mind and social stress is not strong without emotional intelligence, which has implications for the current state of interventions for HFASD, as theory of mind is the typical foci (Fletcher-Watson et al., 2014).

The second research question examined the extent to which performance on theory of mind and emotional intelligence measures affect social stress levels differently for individuals with HFASD as compared to their typically developing peers. As mentioned previously, it was hypothesized that the HFASD group would score significantly lower on the theory of mind and emotional intelligence measures and significantly higher on the social stress measure when compared to their typically developing peers. The results of this study suggest that these hypotheses were correct. The means of all three variables, namely theory of mind, emotional intelligence, and social stress, significantly differed between the HFASD and the typically developing group. Specifically, results suggest that 33% of the variance in these variables could be accounted for by whether or not the individual had a diagnosis of HFASD. These results suggest that theory of mind and emotional intelligence impact individuals with HFASD differently when compared to those that are typically developing, which consequently has important implications for social stress levels.

Emotional Intelligence

The findings of the current study extend the findings of previous research (e.g., Salguero, Palomera, & Fernandez-Berrocal, 2012), demonstrating that emotional

intelligence has important implications for the long-term outcomes of adolescents. Low levels of emotional intelligence in typically developing individuals has been associated with poor psychological adjustment in adolescents, including increased social stress and mental health concerns (Salguero et al., 2012). It appears that low levels of emotional intelligence similarly affect individuals with HFASD. Low emotional intelligence and emotional regulation has been cited as a common risk factor for depression and anxiety disorders among both those with HFASD and those that are typically developing (Mazefsky et al., 2014). These potential negative outcomes are a significant concern for individuals with HFASD, as they tend to have less a developed emotional intelligence relative to their typically developing peers, as has been highlighted in this study. Individuals with HFASD typically experience deficits in many areas of emotional intelligence, including emotion recognition (Petrides et al., 2011), self-awareness of one's own emotions (Williams, 2010), and emotional regulation (Mazefsky, Borue, Day, & Minshew, 2014).

Components of emotional intelligence involving perception and recognition of one's own and others' emotions, an understanding of what these emotions mean within a social context, and the ability to use this knowledge to appropriately respond, are particularly difficult for individuals with HFASD (Petrides et al., 2011). This is often problematic in interpersonal relationships, as difficulty understanding the emotion states of others may lead to misunderstandings and miscommunication. There are additional risk factors for individuals with HFASD, including potential negative intrapersonal implications. As an example, the underdeveloped emotional intelligence typically observed in individuals with HFASD contributes to the emotional dysregulation also

experienced in this population (Samson et al., 2014). Underdeveloped emotional regulation has been related to difficulties in social communication (Samson et al., 2014), as well as higher levels of psychopathology in this population, such as developing a comorbid clinical disorder (Mazefsky et al., 2014). Additionally, deficits in emotional regulation play a role in how stress is managed. The inability to appropriately adapt and modify emotional responses when facing stressful social interaction is likely to contribute to the elevated levels of stress experienced by this population, as a result of more pronounced and prolonged feelings of distress (Mazefsky et al., 2013; Mazefsky et al., 2014). Therefore, emotional intelligence has important implications for not only for the social success of individuals with HFASD, but also their general mental health and well being.

Enhancing one's emotional intelligence is likely to have significant implications for how stressful social situations are approached. Trait emotional intelligence includes one's stress management abilities, including stress tolerance and impulse management (Bar-On, 1997). Additionally, trait emotional intelligence includes one's adaptability, which includes flexibility (Bar-On, 1997). These aspects of emotional intelligence will help individuals with HFASD reduce the stress they feel when interacting with others. The results of this study support previous findings, as the individuals who had relatively high emotional intelligence showed a tendency to experience lower stress levels in social situations (Salguero et al., 2012). However, as mentioned above, high levels of emotional intelligence are typically not found in individuals with HFASD (Petrides et al., 2011). If current interventions continue to focus on increasing theory of mind without the necessary emotional intelligence skills of stress management and flexibility, it may have

unintended negative consequences for the wellbeing of this population. Further developed theory of mind may allow for increased insight into the thoughts and feelings of others towards individuals with HFASD. When paired with a less developed emotional intelligence, or abilities to respond to and manage the stress caused from this enhanced insight, social stress is at risk of becoming further exacerbated.

Theory of Mind

Despite theory of mind's insignificant statistical impact on social stress on its own, it did play a significant role in predicting social stress when combined with emotional intelligence. This finding extends previous research that indicated that an increased theory of mind predicts successful social interactions (Wellman, 1990). These theory of mind abilities frequently allow individuals to develop a better understanding of their communicative partner, which may lead to a more positive perception of the individual amongst peers (Sergienko & Ulanova, 2016; Slaughter et al., 2015). It is possible however, that teaching knowledge of other's mental states does not equate to the development of social communicative or emotional regulatory abilities. The results of this study suggest that if interventions related to theory of mind development are provided independent of any other social or emotional skill development, social stress may rise. It is speculated that this may be due to the heightened insight into the thoughts, feelings, and perceptions of others, as well as their difficulty responding to that increased insight. Consequently, in light of previous research (Montgomery et al., 2012; Petrides et al., 2011) and the result of the current study, it appears that interventions to further develop theory of mind should concurrently include interventions to further emotional intelligence.

The individuals with HFASD in this current study differed significantly from their typically developing peers in their performance on a theory of mind measure, which appears to be supported in the research (Hoogenhout & Malcolm-Smith, 2014) and in the diagnostic criteria of ASD that identifies the characteristic social and emotional difficulties this population faces (APA, 2013). This population may develop theory of mind at a different rate or through different means than their typically developing peers (Hoogenhout & Malcolm-Smith, 2014). Thus, it is important that a different approach to teaching theory of mind be used for typically developing individuals relative to those with HFASD. The current approach to teaching theory of mind to typically developing individuals involves one-on-one short sessions that focus on corrective feedback, modeling, use of imagination, and role-play (Hofmann et al., 2016). Although this type of intervention had positive results for typically developing individuals (Hofmann et al., 2016), a different approach may be more successful for those with HFASD. Specifically, previous research has highlighted that individuals with HFASD are often able to cognitively conceptualize theory of mind concepts but may also struggle when applying this knowledge in practice (Hadwin et al., 1997; Begeer et al., 2011). Thus, although the one-to-one knowledge building aspect of this type of training may still be important with this population (Bauminger, 2002), it may be beneficial to incorporate peer to peer interaction as a learning tool, which may allow for concurrent development of emotional intelligence (Chang & Locke, 2016). Incorporating peer mediated instruction and intervention strategies has shown to be an effective and evidence-based method for aiding youth with ASD in social and communication skill development (Sperry, Neitzel, & Engelhardt-Wells, 2010; Zagona & Mastergeorge, 2016). In an intervention that

incorporates peer mediation, typically developing peers would be taught ways to interact and help peers with HFASD build their social skills in natural environments (Sperry et al., 2010). If typically developing individuals, who have an understanding of theory of mind, are paired with peers with HFASD to teach the core components of theory of mind, while simultaneous modelling and practicing emotional intelligence skills, they may be able to develop these skills concurrently. Specifically, focusing on emotional recognition, understanding, and appropriate emotional self-regulation may allow for not only an increased understanding of others, but additionally an ability to apply these concepts to realistic, fluid social settings with peers. If theory of mind and emotional intelligence are both included in interventions, it seems likely that the social outcomes of individuals on the spectrum will also be improved, thereby decreasing unintended increases in social stress.

Social Stress

The impact of social stress on individuals with HFASD has been highlighted in previous research (Bellini, 2004; Morgan, 2006). This study highlights the higher level of social stress experienced by individuals with HFASD, relative to their typically developing peers. Consistent with findings from this study, previous research suggests that individuals with HFASD typically experience elevated levels of social stress (Attwood, 2006; Bellini, 2004; Morgan, 2006). Stress is so prevalent in this population that it has been suggested that it may be a core component of ASD (Morgan, 2006). Social stress arises in many different contexts and is often related to the constantly changing and unpredictable nature of social interactions (Attwood, 2006). Additionally, it has also been suggested that there is a link between one's social skills deficits and social

anxiety (Bellini, 2004). Thus, the results of this study and previous literature suggest that heightened social stress is a common experience for many individuals with HFASD.

There is research however, that contradicts the suggestion that those with HFASD experience higher stress levels than their typically developing peers. Researchers have speculated that in a socially stressful situation, individuals with ASD do not differ in their cortisol reactivity, or stress response, from the typically developing control group (Jansen, Gispen-de Wied, van der Gaag, & van Engeland, 2003). Further, it has been suggested that individuals with ASD may actually have a diminished or blunted stress response when exposed to a potentially threatening social evaluation (Corbett, Muscatello, & Baldinger, 2019; Edmiston, Blain, & Corbett, 2016; Lanni, Schupp, Simon, & Corbett, 2012). This blunted stress response has been speculated to relate to the way that these individuals perceive the event, such that the participants in the study with ASD did not find the social evaluation threatening (Corbett et al., 2019). For a situation to provoke a stress response in an individual, it must be perceived as personally threatening (Corbett et al., 2019; Evans et al., 2013). Therefore, it is believed that because these individuals have difficulty identifying facial affect, also known as a low theory of mind, that they are not stressed by the negative evaluation (Corbett et al., 2019). Although this research was done with individuals with ASD in general, this may be applicable to individuals with HFASD as a part of this larger group that experiences theory of mind deficits (Baron-Cohen et al., 1985). These findings regarding how stress affects this population relates directly to the results of this current study, which suggest that raising the theory of mind in an individual with HFASD could predict higher levels of social stress.

Unfortunately, heightened social stress in individuals with HFASD can have long-term negative effects. One of the notable consequences of heightened stress is the worsening of ASD symptomatology (Khor et al., 2014). Thus, stress may worsen the social challenges that individuals with HFASD experience. Further, heightened social stress in individuals with HFASD is related to heightened symptoms of anxiety (Gillott & Standen, 2007). Anxiety disorders are often comorbid with ASD (APA, 2013; Hofvander et al., 2009), affecting anywhere between 11% to 84% of this population (White, Oswald, Ollendick, & Scahill, 2009). Furthermore, individuals with HFASD have been reported as being more likely than other individuals with ASD to experience an anxiety concern (White et al., 2009). Specifically, social anxiety has been found to be the most frequently reported anxiety-related concern within this population (Bellini, 2006; Kuusikko et al., 2008; Melfsen et al., 2006). It is crucial to prevent social stress from escalating to clinically distressing levels. In addition, the effects of stress and anxiety regarding social interactions may continue, as individuals with HFASD who have heightened levels of anxiety also have been reported to display heightened levels of loneliness (White & Roberson-Nay, 2009). If people with HFASD withdraw socially, they are more likely to experience depressive symptomatology, which may further their social difficulties (White & Roberson-Nay, 2009).

The social anxiety and stress experienced by this population not only negatively impacts their own mental health but can also have cascading effects to the wellbeing of the caregivers of these individuals. Caregivers of individuals with HFASD typically experience negative health consequences, including somatic symptoms, depression, anxiety, and poorer self-perceived general health (Ruiz-Robledillo & Moya-Albiol,

2013). The individual's severity of ASD symptomatology, which may worsen with high levels of social stress (Khon et al., 2014), has been noted as a strong predictor of caregiver stress (Lyons, Leon, Roecker Phulps, & Dunleavy, 2010). The daily social stress that an adolescent experiences could therefore have a direct impact on the stress of the caregiver. Research suggests that emotional intelligence also affects the caregivers of these individuals, and improving emotional intelligence may decrease cortisol levels, as well as improve overall health (Ruiz-Robledillo & Moya-Albiol, 2014). Thus, previous findings in conjunction with the results of the current study suggest that interventions that engage both the adolescent with HFASD and their caregiver in improving their emotional intelligence may have positively impact their levels of social stress, as well as the caregivers' well-being.

Many interventions for youth with HFASD focus on increasing theory of mind, as it is believed that the deficit in this area is responsible for many of the social and communicative difficulties this population experiences (Hoogenhout & Malcolm-Smith, 2014; Mazza et al., 2017). Although the results of this study suggest the benefit and importance of also including all components of emotional intelligence in theory of mind interventions to decrease social stress levels, it may be important to focus most on the stress management aspect of emotional intelligence. Many interventions focus on the theorized source of the difficulties that individuals with ASD and HFASD experience, such as theory of mind (Fletcher-Watson et al., 2014), however they fail to teach real life, dynamic and fluid coping skills to these individuals. In other words, research and practice focus too heavily on addressing the primary source of the stress, such as not being aware of or understanding the thoughts and feelings of others, that they fail to actually teach

individuals the practical skills needed to respond to ever-changing social interaction and how to manage the stress itself. Many interventions lack a social stress reduction component (e.g., Fletcher-Watson et al., 2014), and after examining the multiple negative effects of increased social stress, teaching stress reduction and coping strategies may be a very crucial aspect to improving well-being in this population. More research is needed regarding how stress affects this population and the best method to mediate this, however it is likely to be beneficial to focus on the stress-management aspect of emotional intelligence may as a first step.

The current study is one of few that has examined the specific relationship between theory of mind, emotional intelligence, and social stress in individuals with HFASD (Montgomery et al., 2012). Other researchers have also identified the limited research that examines the psychosocial outcomes for individuals with HFASD (Hofvander et al., 2009). Specifically, there is a lack of understanding of emotional intelligence in this population, including the role of emotional regulation (Mazefsky et al., 2013). The lack of understanding of emotional intelligence in this population may speak to why it appears to have been overlooked as a focus for interventions. Additionally, the stress response in those with HFASD is not well understood (Taylor & Corbett, 2014), particularly when looking at social stress specifically (Levine et al., 2017). Furthermore, the experience of stress is understudied in adolescents with HFASD, as research with this population typically focuses on children or adults (Edmiston et al., 2016). Adolescence is a critical developmental period in life to examine social stress, as this age group typically experiences more social evaluative threats (Edmiston et al., 2016). Consequently, practitioners may not be fully aware of the elevated stress this

specific population experiences, and the potential positive impact that further developing emotional intelligence could have.

Implications for Practitioners and Therapists

The results of this study suggest that interventions designed to improve theory of mind in individuals may not directly affect social stress. In instances in which enhanced theory of mind has been associated with social stress, it appears to have unintentionally contributed to an increase in social stress. Interventions aimed at assisting adolescents to better understand others' thoughts, feelings, and mental states may unintentionally exacerbate their social difficulties by increasing their awareness of the social challenges they experience and ultimately cause them more distress (Khor et al., 2014).

The results of this study suggest that emotional intelligence plays a critical role in the effectiveness of social and emotional interventions provided to individuals on the autism spectrum. Instead of focusing solely on theory of mind, it appears that further development of emotional intelligence is also crucial. Enhanced emotional intelligence appears to assist in the fluid, adaptive application of social and emotional knowledge in ever-changing social situations and ultimately reduced levels of social stress. Further research is needed to determine the effectiveness of providing interventions aimed at further developing theory of mind, however, the results of this study suggest that emotional intelligence has the greatest effect on the social stress levels in this population. As a result, it appears it may be beneficial for practitioners in school, home, and community settings to focus on not only further developing perspective-taking abilities, but also on how to apply the social and emotional knowledge and skills they have. It would be important to do so in a manner that allows them to do so both appropriately and

flexibly, drawing not only on the thoughts and feelings of others, but also the management and regulation of their own thoughts and emotions in social contexts.

Proposed interventions may include the previously mentioned combined conceptual model approach in which individuals are able to further develop both theory of mind and emotional intelligence concurrently and are given the opportunity to practice these skills with their peers in practical settings. Bauminger's (2006) study examining the effectiveness of teaching social cognitive capabilities on the social interactions in youth with HFASD through cognitive-behavioral, ecological and social skill training in a group setting. This type of intervention reportedly increased the individual's theory of mind, executive function, and their ability to apply this knowledge into successful peer interactions (Bauminger, 2006). The children in this study demonstrated an overall improvement in their ability to work collaboratively with their peers, including developing the skills to engage in mutual planning, cooperative work, and sharing (Bauminger, 2006), which could possibly suggest that there was an increase in emotional intelligence. However, this type of group intervention only encouraged individuals to interact with their peers inside of the group setting, thus, their skills were not generalizable to their interactions with peers in other school settings, such as recess. Bauminger (2002) also investigated how this same type of intervention approach, but in an individual setting, would influence their social cognitive comprehension and social interaction abilities. One of the components of this individual approach was to match participants with a peer to interact with during recess and parents were encouraged to engage in interactions at home that are related to the skills being taught in the intervention (Bauminger, 2002). Thus, the learned behaviours from the intervention were

practiced in different social settings, such as class, school recesses, and at home, which predicted an increase in spontaneous positive peer interaction (Bauminger, 2002). The results from Bauminger's (2002, 2006) studies and Sperry and colleagues (2010) research on the importance of peer involvement in interventions suggest that engaging individuals with HFASD a group format intervention that encourages practice of these skills with peers in various social settings may increase the generalization of their social cognitive and interaction abilities. Thus, this intervention could have positive impacts on the participant's theory of mind and emotional intelligence. Therefore, despite explicit investigation on how the intervention in Bauminger's (2002, 2006) studies affects one's social stress levels, the results of this current study that suggest emotional intelligence has a significant inverse relationship to social stress may allow for speculation that this type of intervention may also have a positive impact on social stress. Further research investigating the impact of this type of intervention on social stress would be beneficial.

Cognitive Behavioural Therapy (CBT) may also provide insight regarding how to structure social and emotional interventions for individuals with HFASD (Ung, Selles, Small, & Storch, 2015). When considering the needs of individuals with HFASD, this type of therapy may be beneficial as CBT typically focusses on both skills training and application and practice of these skills (Sze & Wood, 2007). Thus, CBT not only focuses on faulty cognitions and understandings of oneself, others, and the world, but also engages the individual in social skill building and the application of these social skills. Six core components that have been deemed as important in the literature to be cognizant of when doing CBT with an individual who has HFASD to ensure their learning needs are met, including: (a) assessment of the nature and degree of the problem, (b) affective

education, (c) cognitive restructuring, (d) stress or anxiety management, (e) self-reflection, and (f) the practice of new cognitive skills (Attwood, 2003). These components address all variables examined in this current study, including theory of mind through affective education, emotional intelligence through self-reflection and practicing new cognitive skills, and social stress through stress management techniques. Perhaps by focusing on increasing both theory of mind and emotional intelligence through CBT, social stress may be consequently decreased. This outcome has been reported in a case study of an individual with HFASD who was diagnosed with social anxiety disorder and was subsequently treated with CBT, which led to positive social and emotional outcomes (Cardaciotto & Herbert, 2004). Aspects of CBT including cognitive restructuring, role-playing, and homework assignments were used to address fear and avoidance of social situations, and profoundly impacted the individual through a significant decrease in both social anxiety and depressive symptoms (Cardaciotto & Herbert, 2004). CBT has the ability to decrease social anxiety, a potentially more impairing and pervasive form of social stress, and it may therefore be beneficial for individuals with HFASD who experience stress as a result of their social and emotional difficulties.

The creation of a peer-mediated group in schools and community organizations that draws from the CBT model may assist practitioners in increasing emotional intelligence, which also contributes to stress management skills (Laugeson & Park, 2014). Although social stress may decrease in these interventions, it is also important that practitioners, teachers, parents, and other care providers view this decrease as a goal itself, rather than simply a positive side effect of these interventions. It is critically important that those working with youth with HFASD recognize the significant social

stress experienced by this population and increase their focus accordingly on further developing stress management skills. Believing social stress will decrease through theory of mind interventions, which do not directly teach stress management skills, may undermine the potential significant of the impact of stress. Social stress should not be thought of as an unintended but welcomed outcome of interventions, but should instead become one of the primary foci of interventions. A focus on not only further developing emotional intelligence components of intrapersonal and interpersonal skills, but also stress management skills is likely to further promote the social and emotional resiliency of youth with HFASD. As such, incorporating both psychoeducation and application in social stress management at home, school, and in the community appears to be a critical addition to the current intervention efforts.

In summary, it is important that interventions for individuals with HFASD incorporate both social and emotional skill building and application of these skills to ensure the best outcomes for this population. Providing group programs that focus on improving both theory of mind and emotional intelligence in schools or community centres may allow this population the best opportunity to improve their social stress levels. Additionally, spreading awareness of the effects of interventions that solely focus on theory of mind to professionals who work with individuals on the spectrum may inspire changes in current programming.

Study Limitations and Suggestions for Future Research

Sample Size. One of the major limitations of this study is the relatively small sample size. Using a sample of 35 individuals for the HFASD and the control group to equal 70 participants total limits generalizability. Additionally, the sample was chosen

based on accessibility, rather than having a randomly selected sample. This again may limit the generalizability of the results of this study. Importantly, however, despite the small sample size, this current study had enough participants to obtain some statistically significant results. Furthermore, it can be argued that because adolescents with HFASD are a specific sub-population of the broader autism spectrum population, each individual participant may represent a larger group. In addition, sampling from a larger geographical area would have allowed for not only a larger sample, but also may have made random selection a possibility. Doing so in future studies may increase generalizability and allow greater deductions to be made from results.

Self-Report. Self-report measures represent another major limitation of this study. Measuring one's emotional intelligence through self-report measures could produce biased results. It is possible that an individual with HFASD may not have a full understanding of their social and emotional challenges, and/or the severity of those challenges. Future studies would benefit from the use of additional measures to gather information, such as using observation in conjunction with these self-report measures. Importantly however, previous research conducted with individuals with HFASD regarding their anxiety has supported the use of self-report due to the limited agreement between parent and self-reports of the youths' experience of anxiety (White & Roberson-Nay, 2009). It has been suggested that anxiety is an internal process that parents may not be able to accurately gauge in their child (Mazefsky et al., 2014). Consequently, the researchers chose not to use the parent-report scales of Interpersonal Skills on the BASC-2 to inform the social stress levels of the participants due to the irrelevance of it to the dependant variable of social stress and an inconsistency in previous research between

parent and self report results on the BASC-2 (Taylor et al., 2018). Examination of the parent and self report scales on the BASC-2 with individuals with HFASD revealed significantly discrepant results (Taylor et al., 2018). Research with individuals with HFASD has also highlighted the lack of association between self reported anxiety and parent-reported social functioning (White & Roberson-Nay, 2009). Thus, examining this parent report scale did not appear to provide greater insight into the very subjective and individual experience of social stress. Although self-report may provide important insight into an individual's experience of social stress, it also may be beneficial to also utilize a measure of physiological stress. The Trier Social Stress Test (TSST) is a laboratory paradigm that involves exposing an individual to a social evaluative threat to examine the cortisol and behavioural response (Buske-Kirschbaum, Pirke, & Hellhammer, 1993). This method has been used to measure social stress with individuals with ASD and those that are typically developing (Lanni, Schupp, Simon, & Corbett, 2012; Edmiston et al., 2016). A final consideration when determining appropriate measures of social stress with validity evidence in future studies is the importance of context, as individuals with ASD may display different patterns of stress responses depending on the type of social stressor (Corbett et al., 2019). It is important to note that the BASC-2 allowed for sufficient examination of social stress for the present study; this assessment instrument has good reliability and validity (Reynolds & Kamphaus, 2004) and is a commonly used assessment measure with individuals with HFASD (e.g., Lopata et al. 2010; Mitchell, Mrug, Patterson, Bailey, & Hodgins, 2015; Taylor et al., 2018).

Diagnostic Consideration. The diagnostic changes that have occurred as a result of the most recent revision of the DSM regarding ASD highlight another limitation of this

study. The data analyzed in this study was originally conducted prior to the 2013 revisions to the DSM. Therefore, participants were recruited using AS criteria and inclusionary measures, which no longer exists in the current fifth edition of the DSM. Consequently, the conclusions drawn from this study's findings may be more generalizable if this study were done with the current diagnostic criteria of HFASD, as it may be more broad than AS. Importantly however, as discussed previously, individuals with AS would now be diagnosed with ASD without intellectual and language impairments, and thus this limitation can also be viewed as a strength as it controls for the underdeveloped intellectual and language abilities that would significantly confound any findings of social and emotional difficulties that require these competent intellectual and language abilities.

Future Research. Future research examining not only how emotional intelligence and theory of mind affect social stress in individuals with HFASD, but additionally look at how the further development of these concepts relate to their observed social abilities would likely be of great benefit. Investigating the long-term effects of these interventions on both social stress and social skills through a randomized or quasi-randomized experimental design would provide even greater insight into the relationship between these factors and potentially implications for causation.

Finally, conducting future research that compares and contrasts different types of interventions aimed at furthering theory of mind and emotional intelligence both independently and concurrently could have important implications for the wellbeing of individuals with HFASD. This type of research may ultimately increase the effectiveness of interventions for youth on the autism spectrum.

Summary

Despite the aforementioned limitations, the results of this study revealed that emotional intelligence, but not theory of mind, predicted self-reported social stress levels in individuals with HFASD and those that are typically developing. Importantly however, emotional intelligence and theory of mind together significantly predicted social stress levels for both groups. Furthermore, the combination of a well-developed theory of mind and an underdeveloped emotional intelligence in individuals with HFASD is predictive of high social stress levels. As such, interventions for those with HFASD that focus solely on increasing theory of mind, without concurrently developing emotional intelligence, may unintentionally create social stress. Interventions that address social and emotional challenges utilizing both theory of mind and emotional intelligence components therefore appear to hold great promise. Although these two concepts are distinct, the results of this study suggest they should be paired in interventions to promote social and emotional wellness. Intervention efforts focused on enhancing both theory of mind and emotional intelligence for individuals with HFASD may be incredibly beneficial. Further, interventions are likely to greatly benefit from the incorporation of practical applications of social and emotional knowledge. Specifically, introducing a peer group-based program that provides psychoeducation regarding emotion awareness, understanding, and recognition in oneself and others, as well as emotional regulation, and appropriate and flexible ways to respond in emotionally laden contexts is likely to have a positive impact in the lives of individuals with HFASD. In sum, although the results of this study are preliminary, they strongly suggest that the social and emotional challenges that individuals with HFASD experience is multifaceted, and both theory of mind and

emotional intelligence are likely to cumulatively contribute to increased positive social and emotional outcomes in youth on the autism spectrum during their critical transition into adulthood.

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Appendix A

Ethics Approval for the University of Saskatchewan

182

Appendix A: Institutional ethics approval certificates

University of Saskatchewan
Behavioural Research Ethics Board (Beh-REB)

9-Jun 2006

Certificate of Approval

PRINCIPAL INVESTIGATOR: Vicki Schwan DEPARTMENT: Educational Psychology and Special Education BEH#: 06-106

STUDENT RESEARCHERS
Janine Montgomery, Danielle Dyke, Jo-Anne Burt, Candace Kohut, Yvonne Hindes

SPONSOR
UNFUNDED

TITLE
Emotional Intelligence and Resiliency in Individuals with Asperger Disorder

CURRENT APPROVAL DATE
29-May-2006

CURRENT RENEWAL DATE
01-May-2007

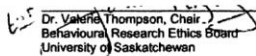
The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS

The term of this approval is five years. However, the approval must be renewed on an annual basis. In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: <http://www.usask.ca/research/ethical.shtml>

APPROVED


Dr. Valérie Thompson, Chair
Behavioural Research Ethics Board
University of Saskatchewan

Please send all correspondence to:

Ethics Office
University of Saskatchewan
Room 306 Kirk Hall, 117 Science Place
Saskatoon SK S7N 5C4
Telephone (306) 966-2084 Fax (306) 966-2069

Appendix B

Ethics Approval for the University of Manitoba

183

UNIVERSITY
OF MANITOBA

APPROVAL CERTIFICATE

26 June 2006

TO: Janine Montgomery
Principal Investigator

FROM: Bruce Tefft, Chair
Psychology/Sociology Research Ethics Board (PSREB)

Re: Protocol #P2006:052
"Emotional Intelligence and Resiliency in Individuals with Asperger Disorder"

Please be advised that your above-referenced protocol has received human ethics approval by the **Psychology/Sociology Research Ethics Board**, which is organized and operates according to the Tri-Council Policy Statement. This approval is valid for one year only.

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

Please note:

- if you have funds pending human ethics approval, the auditor requires that you submit a copy of this Approval Certificate to Kathryn Bartmanovich, Research Grants & Contract Services (fax 261-0325), including the Sponsor name, before your account can be opened.
- if you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.

Appendix C

Ethics Approval for the University of Calgary

184



MEMO

Conjoint Faculties Research Ethics Board (CFREB)
 Research Services Office
 Main Floor, Energy Resources Research Building
 Research Park
 Telephone: (403) 220-3782
 Fax: (403) 289-0693
 Email: bonnie.scherrer@ucalgary.ca

To: Dr. Vicki Schwean
 Division of Applied Psychology,
 Faculty of Education **Date:** June 23, 2006

From: Dr. J. Kent Donlevy, Acting Chair
 Conjoint Faculties Research Ethics Board

Re: Certification of Institutional Ethics Review – "Emotional Intelligence and Resiliency in Individuals With Asperger Disorder"

On behalf of the Conjoint Faculties Research Ethics Board (CFREB), this is to acknowledge receipt of the proposal, consent forms, and recruitment materials submitted to the University of Saskatchewan Behavioural Research Ethics Board for the above-named project, and copy of the ethical clearance from the University of Saskatchewan dated 29 May 2006. The University of Calgary accepts your application in this format and herewith confirms ethical clearance. Accordingly, a copy of this letter should be attached to your original clearance granted by the University of Saskatchewan.

In accordance with the approval issued by the University of Saskatchewan REB, you have been named as principal investigator for this project on the University of Calgary ethics clearance. Referral for individuals with questions regarding their rights as participants, however, will be to the University of Saskatchewan REB (as outlined in the study consent forms), since there is a student researcher, Ms. Janine Montgomery, at the University of Saskatchewan, and the original approval was issued by that institution's REB; we have advised the University of Saskatchewan Behavioural REB that we attend to their jurisdiction with respect to the action of the student researcher in this instance.

The CFREB should be kept apprised of any modifications to the protocol that are authorized by the principal investigator's institution. A progress report must be submitted 12 months from the date of this letter, and you should provide the expected completion date for the project. A form for this purpose is available at the following website: http://www.ucalgary.ca/UofC/research/html/ethics/info_facres.html
 Written notification must be sent to the CFREB when the project is complete or terminated.

In closing, let me take this opportunity to wish you well in your research endeavors.

Sincerely,

J. Kent Donlevy, M.Ed., LLB, Ph.D., Assistant Professor
 Faculty of Education and
 Acting Chair, Conjoint Faculties Research Ethics Board

Approval D

Ethics Approval for the University of Lethbridge



Office of Research Ethics
4401 University Drive
Lethbridge, Alberta, Canada
T1K 3M4
Phone: (403) 329-2747
Fax: (403) 382-7185
FWA 00018802 IORG 0006429

January 14, 2019

Dear Paige Rist,

In accord with University of Lethbridge policy, a delegated review has been conducted for your proposed research involving an anonymous aggregated dataset file for the human research study titled "Emotional Intelligence and Resiliency in Individuals with Asperger Disorder" (ethics certification previously provided by the University of Saskatchewan, University of Manitoba, and University of Calgary for original data collection in 2006).

This is to confirm that, based on the information provided that the research relies on anonymous material that does not contain any identifying information, your research does not require ethical review by the Human Subject Research Committee (HSRC).

The Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2 2014) is the standard by which the HSRC conducts its ethical review of research applications involving human participants. It is our interpretation of the guidance provided in Chapter 2, Article 2.4 ("REB review is not required for research that relies exclusively on secondary use of anonymous information, or anonymous human biological material, so long as the process of data linkage or recording or dissemination of results does not generate identifiable information") that your research falls under the category of research exempt from REB review.

If you have any questions, please do not hesitate to contact me.

A handwritten signature in cursive script, appearing to read 'Susan Entz'.

Susan Entz
Research Ethics & Compliance Officer
Office of Research & Innovation Services
University of Lethbridge
Phone: (403) 329-2747
Fax: (403) 382-7185
Email: susan.entz@uleth.ca