MULTIMETHOD ASSESSMENT OF SOCIAL-EMOTIONAL COMPETENCE
IN CHILDREN WITH SELECTIVE MUTISM

by

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Abstract

Selective mutism (SM) is a rare childhood anxiety disorder associated with significant psychosocial impairment. Despite the understanding that social-emotional functioning is essential to mental health and well-being, few studies to date have examined the social-emotional competencies of children with SM. The current study documents the social lives of 31 children aged 4 to 10 years old with SM through a multi-method assessment procedure. Specifically, the social-emotional competence of children with SM was assessed using (1) parent reports obtained in semi-structured interviews, (2) parent and teacher reports of social skills using established rating scales, and (3) multiple, direct measures of emotion recognition abilities using standardized norm-referenced assessments. This is one of the most extensive studies of the social-emotional competence in children with SM to date, and thus, contributes greatly to our understanding of this disorder.

Consistent with previous research, parents and teachers in the current study reported that children with SM have “Below Average” social skills. A unique contribution of the present study is the finding that children with SM made more errors labelling the emotions depicted on child and adult faces compared to the normative sample, and tended to make the most errors on angry faces compared to happy faces on child and adult facial stimuli. Further, results from correlational analyses revealed that parent, but not teacher, ratings of poorer social skills were related to more emotion recognition errors, which is the first study to document a relationship between errors at various stages of social-information processing (i.e., encoding/interpreting facial stimuli and social skill problems). Results from the current study indicated that children with SM have problems in various areas of social-emotional competence that extend beyond our previous understanding of the disorder.
Lay Summary

The goal of the current study was to better understand the social-emotional lives of children with selective mutism (SM). This is the most extensive study of the social-emotional functioning of children with SM; multiple measures examining a variety of social-emotional competencies were assessed, including parent and teacher ratings of social functioning as well as direct standardized measures of emotion recognition.

Parents and teachers reported that children with SM have “Below Average” social skills, with particular challenges engaging in social interactions with peers. As well, children with SM made more errors labelling the emotions displayed on child and adult faces compared to same-aged peers, and tended to make the most errors on angry faces compared to happy faces. These results, along with results suggesting a link between errors on emotion recognition abilities and social skills, offer information about how children with SM function socially and offer novel contributions for intervention.
Preface

The current study was conducted in conjunction with a larger research project examining the treatment outcomes of children with SM at B.C. Children’s Hospital Mood and Anxiety Clinic, which received ethical approval from the UBC Behavioural Research Ethics Board (Approval Certificate #H14-03232). I am a co-investigator of the aforementioned study and was responsible for choosing measures and designing the current study, assisting with obtaining ethics approval, and collecting the majority data for the current study (providing informed consent, scheduling and conducting each research visit in which all direct assessment measures were completed, scoring and documenting the results). All activities were conducted under the supervision of Dr. Rosalind Catchpole, the primary investigator of the treatment outcome study.
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I would like to express gratitude to all of the families who participated in the current study. Finally, a special thank you to my committee members, the School Psychology faculty, and my peers at UBC for their contribution to my professional and academic development.
Dedication

I dedicate the completion of my dissertation to my husband, Cameron, and son, Owen. To Cameron, for your partnership and unwavering support. To Owen, for the gift of perspective. With love and gratitude, thank you.
Introduction

Relationships are integral to healthy social and emotional development. For decades, researchers have been interested in examining how children interact and get along with peers: how they play together and take turns, show concern for one another, and problem-solve during conflict (Hartup, 1983; 1996). Social competence is considered the broad ability to appropriately and successfully interact with others based on one’s ability to integrate behavioral, cognitive, and affective skills flexibly in diverse social situations (Bierman & Welsh, 2000; Semrud-Clikeman, 2007; Spence, 2003; Spence, Donovan, & Brechman-Toussaint, 1999).

Social competence is an expansive and complex term that encompasses related constructs such as social information processing, empathy, perspective taking, social communication, and social skills, to name a few. Social competence, however, is highly connected to emotional competence (Low & Hymel, in press), which is defined by Saarni (1990) as “the demonstration of self-efficacy in the context of emotion-eliciting social transactions” (p. 116). Emotional competence refers to a set of skills that enables one to recognize, accept, regulate and communicate an emotional experience within the context of an emotionally eliciting social interaction to achieve a desired outcome. Social and emotional competencies are conceptually linked and overlap considerably, which means that social competence is heavily influenced by emotional states/experiences and emotional competence is anchored in social meaning (Low & Hymel, in press). For the purpose of the current study, social-emotional competence is used to describe the abilities and skills necessary for appropriate and positive social interactions, which include emotional awareness and recognition.

Problems in social functioning may arise from competence (i.e., a lack of a particular social skill) and/or performance (i.e., the inability to successfully use the skill) deficits
that interact with emotional states and coping skills. In general, children and youth with anxiety disorders tend to experience social difficulties (see Semrud-Clikeman, 2007 and Lijster et al., 2018 for reviews) and are often described as socially inhibited, shy, and withdrawn. They are more likely to be socially neglected by peers compared to non-anxious children (Strauss, Lahey, Frick, Fram, & Hynd, 1988), perhaps as a result of their lack of social engagement. It is plausible that children with anxiety disorders lack appropriate social skills to successfully engage with peers. Alternatively, they may have acquired the necessary skills to perform social behaviours, but are unable to use the skills in certain social situations due to an overwhelming fear of embarrassment. According to parent and teacher reports (e.g., Crawford & Manassis, 2011; Ginsburg, La Greca & Silverman, 1998) as well as observations and performance tasks (e.g., Spence, Donovan, & Brechman-Toussaint), children with anxiety disorders have poorer social skills compared to healthy control groups, which in turn, are associated with lower quality friendships and greater risk of peer victimization (Crawford & Manassis, 2011). Although it is clear that anxious children have trouble forming and retaining positive social relationships with peers, little is known about links between specific types of anxiety disorders and social relationship problems (Coplan & Ooi, 2013).

One form of anxiety that has significant implications for children’s social relationships is selective mutism (SM), a childhood anxiety disorder characterized by a lack of speech in certain social situations despite speaking in other situations (American Psychiatric Association, 2013). Due to the fact SM has only recently been categorized in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; American Psychiatric Association, 2013) as an anxiety disorder, the vast majority of studies to date examining the links between anxiety disorders and social-emotional functioning have not included children with SM, and thus, the
impact of SM on social relationships is poorly understood. The purpose of the current study was
to examine the social-emotional competence of children with SM using multiple methods of
assessment.

Social-emotional competence is an important consideration for children with SM due to
the fact that children with SM often remain socially withdrawn even after mutism symptoms are
resolved (Dombrowski, Gischlar, Mrazik, & Krol, 2011). In one retrospective study, 45 adults
formerly diagnosed with SM who were asked about their experiences in childhood (Remschmidt,
Poller, Herpertz-Dahlmann, Hennighausen, & Gutenbrunner, 2001) reported experiencing more
social problems, greater dependency on others, and less confidence than others. Given the
retrospective nature of this study and lack of a comparison group, these adult reports could be
biased towards more negative accounts of their early social problems. Further, the study reported
general problems related to social functioning rather than specific social deficits related to SM,
such as emotion recognition problems.

As documented in the review to follow, only four studies have since been published on
the social-emotional functioning of children with SM (Carbone et al., 2010; Cunningham,
McHolm, & Boyle, 2006; Cunningham, McHolm, Boyle, & Patel, 2004; Longobardi, Badenes-
Ribera, Gastaldi & Prino, 2018). All four studies relied exclusively on paper-and-pencil
questionnaires. Three of the four studies (i.e., Carbone et al., 2010; Cunningham et al., 2004,
2006) examined the social skills of children with SM using parent and teacher reports of
observed social behaviours and all three found that children with SM had poorer social skills
compared to non-anxious controls. Using a peer nomination questionnaire, Longobardi and
colleagues (2018) investigated the social relationships of Italian children with SM and found no
differences in social status between children with \( n = 15 \) and without SM \( n = 60 \). Teachers, in
In contrast, reported feeling less close to children with SM compared to the non-affected students. No studies to date have examined the ways children with SM process and interpret social information, such as facial cues of emotion. The current research study extends the literature on the social-emotional competencies of children with SM by directly assessing discrete abilities (emotion recognition) as well as reported social behaviours, as observed by parents and teachers.

It is necessary to examine multiple aspects of social-emotional functioning in children with SM using a variety of measures in order to obtain a comprehensive understanding of any potential areas of difficulty. Parent and teacher reports of social skill deficits are often used, especially in studies of children with SM, given the limited social engagement and selective communication of the children. However, observational reports of behaviours are insufficient in understanding social problems faced by children with SM. Direct measures of social cognition assess whether or not a child can accurately process social information, which helps elucidate the differences between competence and performance deficits. For example, if a child has difficulties looking at a face and identifying the emotion displayed by the facial expression, those difficulties may help explain certain aspects of social competence that are not entirely explained by performance. Facial emotion recognition, or the ability to accurately recognize and interpret the facial expressions of emotions (e.g., happiness, anger, fear) in others, is one example of a social cognitive skill that can be directly assessed in a laboratory setting, does not require the child to speak (which is important when studying children with SM) and is related to social competence (Semrud-Clikeman, 2007).

In the present study, both direct (emotion recognition) and indirect (parent and teacher reports) measures were used to elucidate the social-emotional functioning abilities of children with SM in order to identify and better understand any problems in their social relations and also
improve current methods of intervention. In order to better understand SM as an anxiety disorder, an overview of childhood anxiety disorders first is provided, followed by a review of the research on SM, including common comorbid anxiety disorders, maintaining factors of the disorder, and social competencies of children with SM.
Literature Review

Childhood Anxiety Disorders

Anxiety is an emotion characterized by excessive fear, worry, and doubt, which occurs in response to an anticipated threat in the environment. Anxiety is a normal and adaptive experience. However, diagnosis of an anxiety disorder is warranted when symptoms are severe, persistent, and cause significant interference in life (American Psychiatric Association; APA, 2013). Anxiety disorders are the most common mental health concern in children and youth and are twice as likely to occur in girls compared to boys (APA, 2013). Prevalence estimates indicate that 3.8 to 6.5 percent of children in British Columbia, between the ages of 4 and 17 years, meet criteria for an anxiety diagnosis (Wadell & Shepherd, 2002; Wadell, Shepherd, Schwartz, & Barican, 2014), with lifetime prevalence estimates reported to be as high as 33.7 percent (Bandelow & Michaelis, 2015). If left untreated, childhood anxiety disorders tend to be chronic and are associated with significant psychosocial and financial costs for the individual, the family, and society at large (Bodden, Dirksen, & Bogels, 2008; Ost & Treffers, 2001). Specifically, childhood anxiety disorders are associated with academic underachievement and peer problems and are predictive of future anxiety, mood, conduct and substance misuse disorders in adolescence and adulthood (Bittner, Egger, Erkanli, Costello, Foley, & Angold, 2007; Costello, Egger, & Angold 2004; Woodward & Fergusson, 2001).

A number of risk factors are associated with anxiety disorders, both individual (e.g., genetic, temperament, neurobiological) and environmental (e.g., stress, trauma, drug exposure, family history of anxiety, parenting style). The predictive value of these factors, however, remains unclear due to the bidirectional relationships that likely exist among variables, the reliance on retrospective data to determine the factors, and imprecise distinctions between
pathologic and normal levels of anxiety when studied (see Merikangas & Pine, 2002 for a review). Currently, the principles of multifinality (i.e., many outcomes of the same risk factor) and equifinality (i.e., diverse risk profiles leading to the same endpoint) are considered most appropriate when discussing the risk and vulnerability of anxiety disorders. For example, a child is at a 3- to 5-fold increased risk of developing an anxiety disorder if a first-degree family member has an anxiety disorder (Merikangas & Pine, 2002), yet this vulnerability is complicated when factors such as anxiety subtype, parenting styles, and child characteristics (age, gender, temperament) are considered.

The *DSM-5* (APA, 2013) includes seven different anxiety diagnoses: separation anxiety disorder, generalized anxiety disorder, social anxiety disorder, specific phobia, panic disorder, agoraphobia and selective mutism. Core features that occur across anxiety disorders include cognitive (e.g., excessive fear or worry), physiological (e.g., sympathetic arousal, somatic complaints), and behavioural (e.g., anxious avoidance) symptoms. Anxiety disorders tend to co-occur and are commonly comorbid with other mental health disorders in childhood, including depression and sleep problems (Alfano, Ginsburg, & Kingery, 2007; Costello, Egger, & Angold 2004). For example, decades of research have documented the robust relationship between selective mutism (SM) and other anxiety disorders, most notably social anxiety disorder (see Sharp et al., 2007 for a review).

**Selective Mutism**

The extant literature on SM is limited to few published works, small sample sizes, and overreliance on single subject descriptions. In Muris and Ollendick’s (2015) review of the SM literature, the authors conducted a web search which yielded only 110 published research studies on the topic of SM. Of these, they chose to closely examine 25 studies (10 of which were
descriptive and 15 were comparative). Of the 15 comparative studies, the mean number of SM participants was 32 (range 10 to 70). Shifting conceptualizations of SM and low base-rates of the disorder compared to other anxiety diagnoses contribute to a lack of information on SM and its associated characteristics. Despite the limitations of small sample sizes and few empirical studies, a review of this area of research nevertheless informs the current understanding of the disorder and highlights promising areas of future research.

Selective mutism is classified as a childhood anxiety disorder characterized by the consistent failure to speak in certain social situations, despite speaking in other contexts (APA, 2013). Selective mutism is rare, with the majority of prevalence rates falling below 1% (Viana et al., 2009), although one study estimated 1.9% (Kumpulainen, Rasanen, Raaska, & Somppi, 1998). Variability in estimates may be due to differences in assessment methods or diagnostic criteria employed, age of children, and settings (e.g., geographic, clinic) in which the children with SM were sampled (Bergman et al., 2002; Elizur & Perednik, 2003; Kopp & Gillberg, 1997; Kumpulainen et al., 1998). For example, school surveys asking teachers to identify children within their classroom who do not speak tend to provide higher estimates of the disorder compared to clinical samples in which parents are seeking treatment (see Muris & Ollendick, 2015 for a review).

More girls than boys are diagnosed with SM; the reported female-to-male ratio estimates range from 2.6:1 to 1.5:1 (Dombrowski et al., 2011). Estimates regarding the average age of onset for SM fall between 2.7 and 4.1 years, although most children with SM are first assessed between the ages of 6.5 and 9 years (Dombrowski et al., 2011; Kumpulainen et al., 1998). Early identification of SM is especially challenging since many parents do not recognize the problem
until their child enters school, which inevitably impacts efforts to treat the disorder closer to the first onset of symptoms.

No prospective, longitudinal studies examining the long-term impact of untreated SM currently exist, and thus, spontaneous remission rates for SM are unknown. However, research has documented the negative effects of untreated childhood anxiety disorders, which include increased risk for depression, social isolation, academic underachievement, and substance abuse in adolescence (e.g., Kendall, Safford, Flannery-Schroeder, & Webb, 2004).

There is currently no single known cause of SM (Dombrowski et al., 2011; Viana et al., 2009). Several etiological hypotheses have been articulated, which include psychodynamic, trauma, and neurodevelopmental perspectives, but none of these theories have empirical support (see Holka-Pokorska, Pirog-Balcerzak, & Jarema, 2018 for a brief review). The most recent and comprehensive perspective, offered by Viana and colleagues in 2009, is developmental psychopathology theory, which assumes that SM results from multiple (e.g., biological, developmental, ecological) and interactive pathways. This theory is consistent with research indicating that a family history of anxiety (i.e., genetics/heritability), shyness/inhibition (i.e., temperamental characteristics), and overprotective or controlling parenting styles may be risk factors for SM (Chavira, Shipon-Blum, Hitchcock, Cohan, & Stein, 2007; Dombrowski et al., 2011; Ford et al., 1998; Krysanski, 2003; Sharp et al., 2007; Viana et al. 2009).

Selective mutism is highly related to other anxiety disorders. For example, a retrospective examination of 155 people who experienced SM in their lifetime found significant links between SM and early temperamental characteristics (i.e., slow-to-warm) that were similar to children with other anxiety disorders (Ford, Sladeczek, Carlson, & Kratochwill, 1998). Further, Steinhausen and Jutzi (1996) found that across 100 cases of individuals with SM, the most
prominent features of the disorder included shyness, anxiety, and other internalizing problems (i.e., withdrawal, social difficulties, thought problems). These findings are supported across multiple examinations, where authors reported that over 70% of their sample (40 out of 54 children with SM) were more likely to meet criteria for an anxiety disorder (Kristensen, 2000) and had significantly more internalizing symptoms compared to matched controls (Bergman et al., 2002). Selective mutism is most often associated with social anxiety disorder, as discussed below.

**Selective Mutism and Social Anxiety Disorder**

Selective mutism is commonly diagnosed with other anxiety disorders, most notably social anxiety disorder (Viana et al., 2009). Social anxiety disorder is defined by the *DSM-5* as a persistent and excessive fear of embarrassment in social or performance situations. Social anxiety disorder and SM share a number of diagnostic features, including the persistent fear of social or performance situations, anxious responses in feared social settings (e.g., crying, freezing, tantrums), and avoidance of certain social interactions (Anstendig, 1999; Bogels et al., 2010). Most children with SM meet criteria for social anxiety disorder (e.g., Anderson & Thomsen, 1998; Bergman et al., 2008; Black & Uhde, 1995; Dummit et al., 1996), and some researchers have hypothesized that SM is an extreme variant of social anxiety disorder, with the lack of speech conceptualized as an effort to avoid social judgment (Black & Uhde, 1992). Others have posited that SM may be a precursor to social anxiety disorder, which tends to have a later age-of-onset (Anstendig, 1999; Bergman et al., 2002; Silveira, Jainer, & Bates, 2004). Further, a select few have argued that SM is not related to social anxiety and should be considered a form of specific phobia characterized by fear of their own speech (Omdal & Galloway, 2007).
Maintenance of Selective Mutism

Selective mutism, like other anxiety disorders, is believed to be maintained by anxious avoidance (Kurtz & Lynas, 2014). The model of anxious avoidance not only contributes to the understanding of SM symptoms, but also to the relationship between SM and social functioning. For example, it is unlikely for a child with SM to engage in typical, appropriate social skills (e.g., eye contact, smile, verbal and nonverbal gestures) in situations that they find distressing, such as social interactions with adults, peers, or both. The goal of current interventions for SM (e.g., Parent-Child Interaction Therapy adapted for SM) is to disrupt the negative reinforcement feedback loop in order to encourage positive verbal interactions with others and reduce anxious avoidance in social interactions (Roslin, 2013).

Rubin (1993) posited that children who avoid social participation (i.e., shy, socially anxious) have impaired social skills (see also Rapee & Heimber, 1997). Similarly, Bohlin and colleagues (2000) found that children who avoided social encounters lacked necessary social skills practice, which negatively affected their social competence. Whether poor social functioning is a consequence or a contributing factor in SM is not altogether clear. A perpetual cycle of anxious avoidance may reduce the number of opportunities for a child with SM to learn and practice appropriate social skills. According to Spence (2003), social skills are “the ability to perform those behaviours that are important in enabling a person to achieve social competence…[which] include a range of verbal and non-verbal responses.” A key clinical feature of SM is the avoidance of social engagement in a variety of contexts, and thus, it is hypothesized that they would be less practiced at social skills such as eye contact and initiating or responding to verbal dialogue. It is also possible, however, that the reverse is true; deficits in social information processing may contribute to poorer social engagement and skill development.
A review of current literature on social competence as it relates to anxiety and SM, respectively, follow in the next section.

**Social Competence and Childhood Anxiety Disorders**

In a cross-sectional examination of Canadian children with anxiety disorders, Crawford and Manassis (2011) reported that poor social skills significantly predicted lower quality friendships which, in turn, put children at risk for peer victimization. According to parent and teacher reports, children with anxiety disorders have poorer social skills compared to healthy control groups (e.g., Crawford & Manassis, 2011; Ginsburg, La Greca & Silverman, 1998). Further, parents of children with anxiety disorders were more likely to report in clinical interviews that their children had impaired peer relationships, characterized by lower levels peer acceptance and poorer quality of friendships compared to nonreferred children (Crawford & Manassis, 2011; Ginsburg, La Greca & Silverman, 1998). Spence, Donovan, and Brechman-Toussaint (1999) also conducted a study that examined the social functioning of children with social anxiety disorder using multiple methods, including rating scales, performance tasks, and direct behavioral observations. Results indicated that children with social anxiety disorder (aged 7 to 14) were rated (self- and parent report) as less socially skilled compared to controls, and they exhibited social skill and performance deficits compared to the control group. For example, observations indicated that children with social phobia interacted less with their peers at school and initiated fewer social interactions than non-anxious peers. Thus, according to multiple informant reports, it is clear that children with anxiety have trouble forming and retaining positive social relationships with peers, although little is known about links between SM and social relationship problems (Coplan & Ooi, 2013).
Social Competence and Selective Mutism

Only four studies to date have explored the social-emotional functioning of children with SM. Three Canadian studies examined the social skills (i.e., behavioral output) of children with SM using parent and teacher reports (Carbone et al., 2010; Cunningham et al., 2004, 2006), and one Italian study investigated the social status and student-teacher relationships of children with SM (Longobardi et al., 2018). As previously described, Longobardi et al. compared groups of children from Northern Italy with SM (n = 15) to children without SM (n = 60) and reported no statistically significant association between social status (i.e., popularity, rejection) and SM, which is consistent with previous research indicating that children with SM perceive themselves as accepted by their peers (Cunningham et al., 2006). With regard to student-teacher relationships, Longobardi et al. found that children with SM did not report differences in their perceptions of their relationships with teachers, although teachers perceived more closeness in their relationships with healthy controls compared to children with SM (r = -.41, p < .01). Despite a lack of perceived closeness, teachers did not report increased conflict with children diagnosed with SM (r = .12).

With regard to social skills, Cunningham and colleagues (2004) reported that parents (d = 0.62) and teachers (d = 0.70) rated children with SM (6 to 12 years of age) as having significantly poorer social skills on a condensed version of the Social Skills Rating System (SSRS; Gresham & Elliott, 1990), a standardized and widely used measure of social behaviours, compared to a group of same-aged peers. Specifically, teachers and parents reported deficits in social assertiveness, or the ability to invite other children over to play and initiate a conversation with others. Given that talking is a major component of successful social interactions, when the ability to speak is impaired, so are the related social skills.
In a later study, Cunningham and colleagues (2006) reported that teachers and parents rated children with SM as being less socially skilled, both verbally (e.g., starting conversations and answering the phone) and nonverbally (e.g., makes friends easily or is liked by others), compared to same-aged peers without SM. Despite parent and teacher reports of social skill deficits, when children with SM were asked directly about their peer relationships, they reported perceiving the same level of peer acceptance as same-aged peers without SM, from the larger community comparison group. These results are consistent with the most recent study conducted by Carbone and colleagues (2010), who compared children with SM ($M = 8.2$ years, $SD = 3.4$ years) to community controls ($M = 7.7$ years, $SD = 2.6$ years) and to children with ‘mixed anxiety’ ($M = 8.9$ years, $SD = 3.2$ years) on parent and teacher reports of social functioning. Relative to parents and teachers of children in the comparison groups, parents and teachers rated children with SM as having poorer overall social skills and as being less socially assertive on the SSRS. Teachers also rated children with SM as lower in self-control, whereas parents reported that their children with SM had difficulties with social responsibility. It should be noted that ratings of children with SM were not significantly different from ratings of children in the mixed anxiety group, with the exception of poorer verbal social skills (e.g., starts or joins in on conversations). In summary, adults across all studies describe children with SM as having difficulties in social functioning. It is not clear, however, whether children with SM also have difficulties processing social information, such as emotional cues in their environment.

The current investigation of social-emotional competence in children with SM is guided by social information processing theory. Social information-processing theory, proposed by Crick and Dodge (1994), provides a model for understanding how individuals think and behave in social situations. The six steps of the social-information model are as follows:
1. Encode relevant stimuli
2. Interpret social cues
3. Establish goals
4. Develop a representation of the social situation
5. Consider options and select a response
6. Act and evaluate effectiveness of response

Lemerise and Arsenio (2000) integrated theories of emotions into Crick and Dodge’s (1994) cognitive social-information processing model to better understand the complexity of processes that may be involved when social problems occur. Specifically, Lemerise and Arsenio posited that a child’s mood, emotions, and level of arousal influence the ways in which social cues are encoded and interpreted (stages 1 and 2). For example, a child with SM may be feeling overanxious and thus unable to accurately interpret cues of threat in their environment. Feelings of anxiety may lead the child to selectively avoid to threatening stimuli (e.g., angry facial expressions) and pay more attention to other cues (e.g., happy faces). The child may also misinterpret the facial expressions of others (e.g., interpret a sad face as angry). Both of the aforementioned scenarios represent problems at the encoding (stage 1) and interpretation (stage 2) stages of social-information processing, which are related to feelings of fear and anxiety.

Problems at early stages of social information processing (i.e., selective avoidance) may lead to biases in goals and subsequent behaviours. Lemerise and Arsenio (2000) argued that children choose hostile or avoidant goals to lower their feelings of arousal, and thus, subsequently engage in antisocial behaviors (like hitting) or become socially withdrawn. Lemerise and Arsenio’s conceptualization of both emotions and cognitions impacting social behavior is consistent with theories of social anxiety, which suggest that internal states of
negative cognitions and physiological arousal lead to biases in appraisals of the social environment (Clark & Wells, 1995; Mogg & Bradley, 1998; Rapee & Heimberg, 1997). Previous research suggests information processing differences between anxious and nonanxious children (see Puliafico & Kendall, 2006 for a review). For example, Hadwin, Frost, French and Richards (1997) found that children (aged 7 to 9) with high levels of trait anxiety were more likely to interpret ambiguous stimuli as threatening compared to children with low anxiety. Moreover, Bell-Dolan (1995) reported that anxious children tended to interpret nonhostile (i.e., accidentally hostile or ambiguous) social interactions as hostile compared to nonanxious children. In regard to labelling the facial expressions of emotions, Battaglia et al. (2004) found that children who were categorized as behaviorally inhibited as toddlers and diagnosed with social anxiety in early childhood tended to mislabel facial displays of anger as disgust, when compared to same-aged peers. Similarly, Jarros et al. (2012) reported that youth (aged 10 to 17) diagnosed with an anxiety disorder (generalized, social, separation, or panic) made more errors labelling angry faces and made fewer errors identifying neutral faces, compared to nonaffected youth.

Consistent with these arguments, in the current study, it is hypothesized that children with SM will display biases in encoding and interpreting social information (problems at stages 1 and 2), and as a result, will make more errors when examining faces that are threatening (e.g., angry) compared to nonthreatening stimuli (e.g., happy). These biases in the early stages of social information processing are posited to emerge in an effort to selectively avoid unpleasant social stimuli and to influence their social behaviours, such as being more socially withdrawn and avoidant compared to same-aged peers. Anger and happiness are considered “early-emerging categories” with acquisition of labels for these emotions occurring before “later-emerging categories” such as fear, surprise, and disgust (Widen & Russell, 2008), and thus, errors in
recognizing emotional expressions of anger and happiness would be most indicative of encoding and interpretation challenges rather than developmentally typical mislabeling errors.

A richer understanding the social-emotional functioning of children with SM is important in developing the most effective and efficient intervention strategies. For example, Busse and Downey (2011) suggest that interventions for children with SM include, “direct social skills training focused on nonverbal and verbal goals (e.g., making eye contact, saying hello when greeted, responding yes or no, initiating conversation)”. If children with SM have difficulties at the information processing stage (e.g., accurately encoding facial expressions and tone of voice), then teaching children to accurately label and interpret facial expressions in other people may be equally or more important than instructing children to engage in appropriate eye contact. In other words, identifying the specific social-emotional skill deficits of children with SM, such as emotion recognition difficulties, would allow for more efficient and effective intervention efforts that directly target such skills, and promote generalization of those skills specifically, rather than spend time practicing more global social skills that they may already have acquired but have problems employing. Emotion recognition is hypothesized to be an area of difficulty for children with SM due to the documented relationship between social anxiety, which is commonly associated with SM, and emotion recognition biases, as described in the next section.

**Emotion Recognition Abilities**

Facial emotion recognition skills develop early. At approximately three years of age, more than 90 percent of children regularly use the primary emotion labels, “happy”, “sad”, “angry” and “scared” (Ridgeway, Waters, & Kuczaj, 1985). Differences in emotion recognition emerge in children as young as four years, with poorer abilities relating to social functioning problems (Nowicki & Mitchell, 1998; Saarni, 1990; Semrud-Clikeman, 2007). Conceptually, it
makes sense that emotion recognition is important in interpersonal functioning; if facial expressions are not correctly identified (e.g., if anger is incorrectly recognized as fear), then subsequent behaviors may be inappropriate and disrupt the social interaction. Although problems identifying facial expressions of emotions in childhood have been linked to problematic peer relationships and school adjustment for children in the general population (Goodfellow & Nowicki Jr., 2009; Nowicki Jr. & Duke, 1994), these links have not yet been investigated in children with SM.

Extant research supports the hypothesized relationship between social anxiety disorder and facial emotion recognition difficulties, particularly regarding problems quickly or accurately identifying the emotions displayed on a person’s face (see Machado-de-Sousa et al., 2010 for a review). Some of the problems that arise are related to perception biases. For example, adults with social anxiety tend to perceive more disapproval in a crowd of faces (Douillez, Yzerbyt, Gilboa-Schechtman, & Philioopot, 2012; Gilboa-Schectmad, Persburger, Marom, & Hermesh, 2005). Such negative biases in social encounters may interfere with one’s interpretation of social successes. Other problems relate directly to accurately recognizing and labeling expressions of emotions in people’s voices, referred to as paralanguage detection. For example, in a study comparing children with anxiety, learning disabilities, and both, children with anxiety tended to be better able to label the emotions expressed in adults’ voices compared to healthy controls (Manassis & Young, 2000). Paralanguage detection, a construct not as commonly studied in children with anxiety as compared to facial recognition, was measured in the current study, which is considered a unique contribution. Assessing paralanguage detection is theoretically important when studying children with SM due to the greater incidence of language challenges in SM populations (Klein, Armstrong, & Shipon-Blum, 2013).
Although most studies have found that higher levels of social anxiety are related to inaccuracies in identifying or classifying facial emotions (e.g., Battaglia et al., 2004, 2010; Simonian, Beidel, Turner, Berkes, & Long, 2001), some studies found no differences between socially anxious individuals and non-anxious controls (Phillipot & Douillez, 2004; Schonfield, Coles, & Gibb, 2007). Discrepancies in results across studies may be due to differences in the samples included (i.e., age/development, ethnicity), and/or the measures and methods of analyses employed. In a review of research on facial affect processing in individuals with social anxiety, Machado-de-Sousa and colleagues (2010) reported that, despite variations in tasks and stimuli, evidence to date suggests individuals with social anxiety have abnormal patterns of processing facial emotions. It is surprising that no studies to date have investigated the facial expression recognition abilities of children with SM given its strong relationship with social anxiety disorder. The current study addresses this gap in the literature.

The most commonly used stimuli with socially phobic adults and children have been the Japanese and Caucasian Facial Expressions of Emotion (JACFEE; Matsumoto & Ekman, 1988), followed by the Pictures of Facial Affect (PFA; Ekman & Friesen, 1976). Two of the three existing studies examining facial emotion processing abilities in children with social anxiety used the JACFEE (Melfsen & Florin, 2002; Stirling et al., 2006), while the other study used the PFA (Simonian et al., 2001). All three found social anxiety related differences in emotion recognition and attention (Melfsen & Florin, 2002; Simonian et al., 2001; Stirling et al., 2006). However, these differences varied across studies. Specifically, the studies reported general facial emotion accuracy deficits in children with social phobia (Simonian et al., 2001), increased reaction time in responding to facial emotion stimuli (Melfsen & Florin, 2002), and a negative bias when attending to facial stimuli (Stirling et al., 2006).
As demonstrated in the above review, studies examining facial emotion recognition abilities indicate that, in general, children with social anxiety respond differently than children without social anxiety. However, despite using similar stimuli (i.e., facial expressions), the overall findings are unclear due to the fact that researchers used different tasks and methods of reporting their findings. For example, Melfsen and Florin (2002) measured reaction time, whereas Simonian and colleagues (2001) reported their results using accuracy metrics. Further, despite the popularity of the JACFEE and PFA with social anxiety, the measures have limitations, most notably the fact that stimuli include only adult faces and the measures have not been used with very young children. In contrast, the Diagnostic Analysis of Nonverbal Accuracy, Second Edition (DANVA2; Nowicki, 2004) is a more recent measure that has been used in over 30 studies to examine the social competence of children and adults (e.g., Carson & Decker, 1999; Cooley & Treimer, 2005; see Crowe, Beauchamp, Catroppa & Andersson, 2010 for a review). The DANVA2 was used in the current study because it includes both adult and child stimuli, and is the most commonly used emotion recognition measure used with children as young as four years of age (Nowicki & Mitchell, 1998).

The Current Study

The goal of the current study was to examine the relationship between aspects of social information processing (i.e., emotion recognition) and social skill (as reported by parents and teachers) in order to better understand social-emotional competence in children with SM. Research to date supports the association between social anxiety and differences in processing facial expressions (e.g., Machado-de-Sousa et al., 2010), as well as childhood anxiety and social information processing distortions (see Puliafico & Kendall, 2006 for a review), yet no studies have examined whether children with SM have similar social cognitive difficulties. The current
The present study was designed to address seven research questions, as described below. Due to the exploratory nature of the current study, the hypotheses are based on information available from theoretical models (social information processing theory) and previous literature on anxiety and selective mutism. The goals of the present study were to first confirm the diagnoses of SM and document the interpersonal relationships in children with SM (Research Question #1), and also replicate finding from previous research indicating that children with SM are rated by parents and teachers as having social skills problems (Research Question #2). Next, the relationship among variables were examined to determine whether social skills, emotion recognition, and selective mutism measures were related in the expected manner (Research Questions #3-5). Finally, the emotion recognition abilities were examined, which is a novel contribution to the field of SM (Research Questions #6 & 7). Based on the literature review provided, the research questions and hypotheses for the current investigation are as follows:

1. How do parents describe the interpersonal relationships of children with SM?
• The current study will document the ways parents describe the interpersonal relationships of children with SM (i.e., quantity of friendships, frequency of peer interactions) using a semi-structured diagnostic interview.

2. Do children with SM have greater social skill difficulties, as reported by parents and teachers on norm-referenced measures, compared to the normative sample?
   • Hypothesis: Consistent with prior research in SM, the hypothesis is that children with SM will have greater social skill difficulties, as reported by parents and teachers, compared to the normative sample on the social skill rating scales.

3. Do children with SM make more errors on norm-referenced measures of social information processing (emotion recognition) compared to the normative sample?
   • Hypothesis: Children with SM will make more errors on norm-referenced measures of social information processing (emotion recognition) compared to the normative sample.

4. Do children with SM make more errors on threatening (e.g., angry) faces compared to non-threatening stimuli (e.g., happy faces) depicted on standardized measures of emotion expression?
   • Hypothesis: Children with SM will make more errors labeling and matching angry faces compared to happy faces.

5. Is there a relationship between parent and teacher reports of SM symptoms and their reports of social skills?
   • Hypothesis: A significant and negative relationship between SM symptoms and reported social skills will be observed.
6. Is there a relationship between the degree of SM symptoms and errors on direct measures of emotion recognition?
   - **Hypothesis:** A significant and positive relationship between the degree of SM symptoms and errors on direct measures of emotion recognition will be observed.

7. Is there a relationship between parent and teacher reports of social skills and emotion recognition abilities in children with SM?
   - **Hypothesis:** A significant and negative relationship between reported social skills and emotion recognition abilities in children with SM will be observed.
Method

Participants

Children diagnosed with SM were recruited from a larger, ongoing clinical treatment study occurring within the outpatient department of the British Columbia (B.C.) Mental Health and Substance Use Services at B.C. Children’s Hospital, located in Vancouver, B.C. The outpatient department provides tertiary mental health consultation to children across B.C. primarily through the Mood and Anxiety Disorders clinic as well as the Infant Psychiatry Clinic. Overall, 31 children with SM were recruited for the current project over a two-year period. The sample size for the current study was commensurate with the expected number of participants to enroll in the larger SM treatment study within two years. Given the fact that SM is a low-incidence disorder, occurring in less than one percent of the population (Viana et al., 2009), a sample size of 31 children for the current study is appropriate and consistent with the larger body of research. According to G*Power 3.1.9.2 (Faul, Erdfelder, Buchner, & Lang, 2009), a sample size of 31 provides 95 percent power to detect a medium to large effect ($d = 0.7$) using Cohen's (1988) criteria for a one-sample, two-tailed t-test ($\alpha = .05$) examining mean differences from a constant.

Several teacher rating scales and one emotion recognition measure were not completed for six children in the present sample due to their young age. Specifically, six children were not yet attending school, and thus, teacher measures were not available for these participants. It should also be noted that emotion recognition subtests from the Diagnostic Analysis of Nonverbal Accuracy, Second Edition (DANVA2; Nowicki, 2004) was not administered to participants aged four years due to the long duration of the measure within the context of the research visit.
**Sample Characteristics.** The sample consisted largely of children whose primary language is English (65.5%) entering treatment for the first time (65.5%). Children of both genders were equally represented (51.6% female). The sample is diverse and consistent with local demographic characteristics, with most participants identifying as Asian (41.9%) or White (35.5%), followed by Multiracial (9.7%), “Other” (9.7%) and South Asian (3.2%). Children ranged in age from 4 to 10 years ($M = 6.76, SD = 1.73$) and were dispersed across grade levels from pre-Kindergarten to Grade 4, although nearly half of the sample were in Kindergarten (23.3%) and Grade 1 (23.3%). Self-reported parent education was gathered for 18 fathers and 19 mothers. Highest level of education for fathers was high school (9.7%), partial post-secondary (12.9%), or completed post-secondary (35.5%); maternal education was reported to be partial (12.9%) or completed post-secondary (48.4%).

All children had a primary diagnosis of selective mutism (SM, as described below); seventeen children (60.7%) also met criteria for a comorbid diagnosis of social anxiety disorder.

**Study Design and Procedures**

All study procedures were approved by the University of British Columbia Behavioral Research Ethics Board (BREB). All qualifying participants were informed about the broader treatment outcome study by a child psychiatrist at B.C. Children’s Hospital who first assessed the child for SM. A study flow chart (Figure 2, see below) details how the current study differs from the broader clinical treatment research project. It should be noted that all data from the current study exist within the broader treatment study, and thus, results from current analyses may be used in future research projects to predict treatment outcomes.
The graduate research assistant (GRA) informed interested parents about the purpose of the study, as well as study risks and benefits, both verbally and in written format. Parental consent (all ages) and child assent (children aged seven years and older) was required for participation. Due to the fact that the current study exists within the broader treatment study, the inclusion and exclusion criteria for the current study are consistent with the treatment outcome study, which are outlined next. It should be noted that the author (Ellen Shumka) was the GRA for the study from January 2016 until July 2017. The majority of data collection (22 participants of 31) was completed by Ms. Shumka prior to her departure for maternity leave. Data for remainder of participants were collected by Ms. Haya Zaid-Alkailani, who was trained by Ms. Shumka (under the supervision of Dr. Catchpole) on all procedures.

**Inclusion Criteria.** Children who met inclusion criteria for the broader clinical treatment study were eligible to participate in the current research. The criteria were as follows: (1)
children were between the ages of four and ten years old, (2) met diagnostic criteria for SM according to the DSM-5, and (3) were referred for treatment in the Mood and Anxiety Disorders Clinic or Infant Psychiatry Clinic at B.C. Children’s Hospital. Due to high comorbidity rates between SM and anxiety as well as other mental health disorders, children could participate if they had comorbid mood, anxiety or externalizing disorders, but only if SM was the primary and most impairing condition. All diagnoses were based on an initial assessment visit with a psychiatrist at B.C. Children’s Hospital in which the Anxiety Disorders Interview Schedule for Children-Parent Version (ADIS-IV; Silverman & Albano, 1996) was administered (as described below).

**Exclusion Criteria.** Children with mental disorders that may impact treatment efficacy and/or require specialized treatment planning (i.e., psychosis, mania, Autism Spectrum Disorder, brain injury or significant cognitive/developmental delay) were excluded from the study. The broader clinical treatment study also required an “Intermediate Level” of English language abilities, as described by the Canadian Language Benchmarks, for the child and at least one caregiver in order to conduct the therapy and assessments in English. Participants were excluded from the study if their English language abilities fell below this criterion. If the child was receiving psycho-pharmaceutical treatment, any change in medication dose or type required participants to wait a full eight weeks prior to receiving treatment in order to document the effects of medication alone on SM symptoms.

**Research Assessment Visit.** Participating families came to the hospital for a research assessment visit conducted by the study research assistant. The research assessment visit was approximately one and a half hours in length and consisted of several language and social functioning measures. The language measures were not considered in the current study.
The research assistant greeted participating families in the waiting room of the hospital and escorted them to a room with couches, toys, a one-way mirror (used for the language assessment), and a computer. At the beginning of the visit, parents and children played alone in the room for several minutes to allow the child to “warm-up” and become more comfortable. Following the brief warm-up period, the research assistant provided the child with a visual schedule of the assessment period. Children were informed that after all activities were completed, they would earn a prize from the prize store. The research assistant was responsible for administering all social-emotional tasks, none of which required a verbal response. It should be noted that the two measures of emotion recognition used in the present study (described below) were counterbalanced to account for any possible order effects.

All assessment sessions were video recorded, and the research assistant scored the child’s responses under supervision of the principal investigator. All social-emotional measures were administered according to the standardized procedures outlined in the manual, as described below. Upon completion of each of the measures, the child was praised for their hard work and provided a checkmark on a visual schedule after completing the task regardless of task performance. At the end of the research visit, each child was provided the opportunity to pick a low-value toy for their participation. All parents were compensated for parking.

**Confidentiality.** Data for the current research project were collected as part of the larger treatment outcome study. All identifying information was removed and participants were assigned a unique research ID number. All original data was stored in a locked filing cabinet in the Principal Investigator’s office, with electronic data kept on a secure server that was password protected. Videotapes were kept in participant files and identified by the research number. All
tapes were viewed on-site to minimize risk of loss and will be destroyed after final project coding is completed to maximize confidentiality; all other data will be kept for five years.

**Measures**

Two considerations within the context of the measurement selection process were that: (1) the current study was designed within a broader treatment outcome study, which did not include a comparison group, and (2) children with SM were unlikely to speak during the research visit. In order to account for these issues, all direct measures utilized during the research visit allowed for non-verbal (i.e., pointing) responses. In lieu of a comparison group, the measures utilized in the present study were standardized and norm-referenced when possible which allowed for comparison of participants to same-aged peers without SM across the age range considered (ages 4-10).

A multi-method, multi-informant approach was used to assess the social-emotional competence of children with SM. The measures included results from a semi-structured diagnostic parent interview to verify the SM diagnosis and gather information about the interpersonal functioning of children with SM. Parent and teacher rating scales measuring caregiver perceptions of the social skills of the children, as well as the direct assessments of emotion recognition (i.e., facial expression recognition, paralanguage abilities) were also included. All measures administered for the current study are described below.

**Anxiety Disorders Interview Schedule for Children for DSM-IV: Parent Version (ADIS-IV).** The ADIS-IV (Silverman & Albano, 1996) is a clinician-administered, semi-structured interview used to assess all childhood anxiety disorders (as well as mood and externalizing disorders). Presence, severity and level of anxious symptoms were assessed in accordance with criteria set out in the *Diagnostic and Statistical Manual of Mental Disorders,*
*Fourth Edition - Text Revision (DSM-IV–TR; APA, 2000)*. A *DSM-5* (APA, 2013) version of this instrument was not available at the time of assessment, and thus, diagnoses were based on *DSM-5* criteria where it differs from previous versions. Clinician diagnosis was determined by considering the number of symptoms endorsed by the parent in conjunction with parent-reported severity and impairment levels, which range from 0 to 8, with a score of 4 or higher indicating clinically severe levels of anxiety. The reliability estimates of the ADIS-IV range from acceptable to excellent, with an overall kappa coefficient of .75 (ranging from .64 to 1.00), inter-rater reliability ranging from .82 to .96 and test-retest reliability ranging from .62 to .88 (Lyneham, Abbott, & Rapee, 2007; Silverman, Saavedra & Pina, 2001).

Psychiatrists involved in the broader SM treatment outcome study conducted the ADIS-IV interviews with all potential study participants to determine primary and secondary (comorbid) diagnoses. As previously mentioned, children must have a primary diagnosis of SM for study inclusion. Parents’ reports from the “Interpersonal Relationships” section of the ADIS-IV included descriptions of their child’s social preferences (e.g., “Does your child have a best friend?”, “Do you think your child has more friends, fewer friends, or the same number of friends as other children their age?”, and “Would your child rather play alone or with other children?”) as well as social opportunity (e.g., “How often does your child play with other children outside of school?”), which were documented for the current study.

In addition to utilizing information from the ADIV-IV to confirm diagnoses, the information gleaned from the “Interpersonal Relationships” section was quantified for descriptive purposes. Frequency counts from all force-choice questions regarding social preference and opportunity for engagement were collected. Scores were transformed into percentages and mean percentage scores for ease of interpretation.
Selective Mutism Questionnaire (SMQ). The SMQ (Bergman, Keller, Piacentini & Bergman, 2008) is a standardized parent-rating scale that measures frequency of speech in three settings: home, school, and social situations/community. In the current research, the SMQ was used to assess severity of SM symptoms and provide additional information to determine study eligibility (i.e., SM as primary diagnosis). The SMQ also provides a continuous measure of SM symptoms, which was used in the current study to examine the relationships between SM symptom severity and measures of social competence (rating scales and direct assessments).

The SMQ consists of 23 items organized into a total score and four subscales: school (6 items; e.g., “when appropriate, my child talks to most peers at school”), home/family (6 items; e.g., “when appropriate, my child talks to family members living at home when other people are present”), social situations/community (5 items; e.g., “when appropriate, my child speaks with store clerks and/or waiters”), and interference/distress (6 items; e.g., “overall, how much does not talking interfere with the life of your child?”). The home, school, and community sections consist of four possible response options using a 4-point scale (from 0 = “never” to 3 = “always”) with lower ratings indicating fewer speech frequencies, and thus, more severe SM symptoms. The interference/distress items the response options also include four response options (from 0 = “not at all” to 3 = “extremely”) where higher scores indicate a greater degree of interference and distress.

The SMQ does not have a manual containing normative data, and thus, no standard scores can be computed. For the present study, a total mean score was computed using the 17 items across school, home, and community settings in order to create a continuous variable measuring frequency of speech. A maximum mean score of three represents a greater frequency of speech reported by parents across settings, and a minimum score of zero reflects parent reports
of their child “never” speaking across settings (e.g., high degree of SM symptoms). The interference/distress items were not used for analyses in the current study.

Studies examining the psychometric properties of the SMQ are limited, although initial reports indicate the measure is psychometrically sound. It has excellent internal consistency (\(\alpha = .97\)) and reliability with adequate discriminant, concurrent and convergent validity (Bergman et al., 2008). For example, the SMQ has a moderate to strong and negative relationship (\(r = -.52, p \leq .001\)) with the talking items on the Social Anxiety Scale for Children-Revised (SASC-R; La Greca & Stone, 1993) and with the ADIS-IV (\(r = -.67, p \leq 001;\) Silverman & Albano, 2004) demonstrating convergent validity. Evidence to support good discriminant validity has also been reported; children diagnosed with SM scored significantly lower (i.e., demonstrated fewer speech frequencies) on the SMQ than children without SM (Bergman et al., 2008). A copy of the SMQ is provided in Appendix A.

**School Speech Questionnaire (SSQ).** The SSQ (Bergman et al., 2008) is an adapted version of the SMQ (see above) for teachers, and is comprised of 8-items (e.g., “when appropriate, this student talks to most peers at school”). Six items measure the frequency of a child’s school speech on a 4-point scale (from 0 = never to 3 = always), with lower scores indicating fewer speech frequencies in the school context. Two items measure the interference/distress (e.g., “how much does not talking interfere with school for this student?”) for the student and are not considered in the total score. The SSQ does not have a manual with published results containing normative data, and thus, no standard scores can be computed. Scores across the six speech items were averaged to compute a total mean score, with a possible range of scores from zero to three. A maximum mean total score of three represents a greater frequency of speech (i.e., “always” speaking) reported by parents across settings, and a minimum
score of zero represents less speech (i.e., “never” speaking), and thus a greater degree of SM severity, at school. The interference/distress items were not used for analyses in the current study.

Studies documenting the psychometric properties of the SSQ are limited, although evidence to date suggests excellent internal consistency (α = .96) and good validity due to the high overlap between the SSQ and SMQ (Bergman, Piacentini, & McKracken 2002).

Social Skills Improvement System, Rating Scale (SSIS-RS). The SSIS-RS (Gresham & Elliott, 2008) is an updated version of the Social Skills Rating System (SSRS) used extensively in clinical and research contexts to examine the social behaviors of children aged 3 to 18 years (Sprague & Walker, 2005). The SSIS-RS has three forms (Parent, Teacher, Child) to provide a multi-rater approach, each form containing 75 to 83 items that describe observable student behaviors and provide scales for Social Skills, Problem Behaviors, and Academic Competence. The 46-item Social Skills scale from parent and teacher forms were used for the current study to assess the reported social behaviours of children with SM in multiple settings. The Social Skills scale is comprised of seven subscales: Communication, Cooperation, Assertion, Responsibility, Empathy, Engagement and Self-Control. Informants rated social behaviors on each item using a four-point scale (from 0 = Never to 3 = Almost Always), with higher scores indicating better social skills.

For the current study, the Social Skills scale total score and seven subscale scores were examined. The Social Skills total scores were first computed by adding the raw scores across all 46 items (possible range of scores = 0 to 138). In order to make scores on the SSIS-RS comparable across participants of different ages, all raw scores from the Social Skills scale were converted into standardized scores (M = 100, SD = 15) by comparing the total raw score to the
sample population using age-based norms from the manual. Seven subscales were also derived by adding the raw scores for items in each subscale (e.g., “Communication” = items 4, 10, 14, 20, 24, 30, 40). The manual does not provide age-based norms for social skills subscales, and thus, no standard scores can be derived. However, the manual includes a table that provides classifications (i.e., “Below Average”, “Average” or “Above Average”) based on subscale raw scores (e.g., a score less than or equal to 3 on “Communication” is considered “Below Average”). Average raw scores were also computed for each of the seven subscales in order to allow for comparison across subscales, which are comprised of either six or seven items.

The SSIS-RS has sound psychometric properties and an extensive normative sample. Internal consistency estimates are high, with reported median scale reliabilities and coefficient alphas for all scales greater than $\alpha = .90$ (Gresham & Elliot, 2008). Test-retest reliability coefficients ranged from $r = .68$ to $r = .86$ (across 41 days) for teachers and $r = .70$ to $r = .80$ (across 61 days) for parents. Interrater reliability for the Social Skills scale is reported to be $r = .62$, which provides support for the variability of observed behaviour across contexts as well as the different perceptions of skills across multiple raters.

**A Developmental Neuropsychological Assessment, Second Edition (NEPSY-II);**

**Affect Recognition Subtest.** During the Developmental Neuropsychological Assessment, Second Edition (NEPSY-II) children sat across from the GRA at a table and answered all questions by pointing. The NEPSY-II (Korkman, Kirk, & Kemp, 2007) is a standardized, norm-referenced, neuropsychological assessment battery for children aged 3 to 16. The Affect Recognition subtest was used in the current study. This subtest is designed to assess a child’s ability to accurately recognize the facial emotion expressions (happy, sad, anger, fear, disgust, and neutral) in other children’s faces. The subtest is comprised of 35 items across four different
tasks, which require the child to recognize, match and remember expressions depicted in photos of child faces. In the initial task, the child was required to indicate whether or not two faces depicted the same affect. In the second task, the child was asked to select two matching faces of the same affect among three or four photographs. In the third task, the child was asked to select a face (among four) that matched the affect of another face located at the top of the page. Lastly, the child was shown a picture of a face for five-seconds and is then asked, from memory, to select two photographs depicting the same affect. Due to the fact that the task is administered according to standardized basal and ceiling rules, not all children were exposed to all tasks depending on their age and level of success across items. All responses were coded as correct (1) or incorrect (0) and a total score was computed for the subtest by adding correct responses (min = 0, max = 35), with higher scores indicating more accurate emotion recognition skills. In order to make scores on the NEPSY-II comparable across participants of different ages, all raw scores from the NEPSY-II were then transformed into scaled scores (M = 10, SD = 3) based on the age norms provided in the manual. Scaled scores were utilized for the statistical analyses.

Psychometric properties for the battery are reported to be strong, although reliability and validity vary according to the subtest (Korkman, Kirk, & Kemp, 2007). Internal consistency for the affect recognition subtest is approximately $\alpha = .90$ (.87 to .92) for children aged 5 to 12, with a reported test-retest coefficient mean of $r = .56$ (.50 to .61) across a mean retest interval of 21 days (range = 12 to 51 days) for children aged 3 to 12 years (Brooks, Sherman, & Strauss, 2015; Korkman, Kirk, & Kemp, 2007). The affect recognition subtest has demonstrated clinical utility in discriminating children with social functioning deficits (e.g., Autism) from controls (as cited in Semrud-Clikeman, 2007).
Preparation of the diagnostic assessment. The
diagnostic assessment of nonverbal accuracy, second
dition (DANVA2). The DANVA2 (Nowicki, 2004) is a
direct measure of emotion recognition used to assess two
domains, facial expression and paralanguage, with each
domain containing both child and adult
stimuli (outlined below). The DANVA2 was administered
according to the standardized
procedures outlined in the manual. Three different
versions of the DANVA2 are available:
traditional photograph, computer, and
internet-based. The computer version was used in the
current study for ease of administration and scoring.
Children participating in the study sat in
front of a computer monitor next to the graduate
research assistant, and the following script was
spoken to the child once seated:

“I am going to show you some pictures of people's faces and ask you to
listen to some sentences. I want you to tell me how the people are feeling by
pointing to either happy, sad, angry, or fearful. Fearful means scared or
afraid. Let’s start by looking at faces. I will show you each face for only a
short time, so you have to look carefully. Here's the first face. Is the person
happy, sad, angry, or fearful [researcher points to the words]?”

The pictures were presented to the child for two seconds each and the child
was required to point to the word (happy, sad, angry, fearful) that corresponded
to their response. The research assistant read each of the choices aloud. If the child did not
answer within 10 seconds, the research assistant repeated the prompt once then said, “Let’s try another one,” and proceeded to
the next picture. The instructions were repeated and adapted for each of the DANVA2
subtests, described next.

Facial expressions. The adult and child facial
expression subtests of the DANVA2 each
consist of 24 photographs of male and female (50%
each) facial expressions of happy, sad, angry
and fearful emotions. Pictures were selected on the basis of high inter-rater agreement (70–80%) regarding the presented emotion, as rated by children (Grades 3, 7 and High School) and young adults (College Students; Nowicki, 2004). The facial expression subtests have been used to study emotional competence in children as young as three years of age (Nowicki & Mitchell, 1998; see Timler, 2003 for a review), with internal consistency estimates ranging from $\alpha = .71$ to $.76$ across ten different studies (Nowicki, 2004). For each picture, children were asked to attend to the picture and point to the word (happy, sad, angry, fearful) that corresponds to their response. Children’s responses were coded as accurate (0) or inaccurate (1) based on the DANVA2 scoring keys (Nowicki, 2004). Higher scores represent a greater number of emotion recognition errors.

For the current study, errors across the 24 items in each subtest (child and adult) were tallied for each child to create a total error score for adult faces (DANVA2-AF) and child faces (DANVA2-CF). Scores were then standardized using age-based norms available in the manual. Specifically, z-scores for each child were computed by subtracting the population mean error from each child’s error score and dividing by the population standard deviation. Z-scores have a mean of zero and standard deviation of one, meaning that a score of zero indicates no difference from the population mean (i.e., average number of errors made by same-aged children). Scores below zero indicate fewer errors than the population mean, and above zero indicate more errors were made than same-aged peers in the normative population. Scores above or below one standard deviation (i.e., a score equal to or greater than -1 or +1) represent a clinically significant deviation from the mean (i.e., more errors than one would expect for a child that age). There are no minimum or maximum possible scores.

**Paralanguage.** The adult and child paralanguage subtests of the DANVA2 each consist of 24 audiotaped items in which both male and female (50% each) professional actors repeat a
neutral sentence (e.g., “I am going out of the room now, but I’ll be back later”) in happy, sad, angry, and fearful voices. Recordings were selected on the basis of high inter-rater agreement (70–80%) regarding the presented emotion, as rated by children (Grades 3, 7 and High School) and young adults (College Students; Nowicki, 2004). For each item, children were asked to listen to the audiotape and indicate the emotion expressed by the adult or child by pointing to the word (happy, sad, angry, fearful) that corresponded to their response. Children’s responses were coded as accurate (0) or inaccurate (1) based on the DANVA2 scoring keys (Nowicki, 2004). Higher scores represent a greater degree of emotion recognition error.

For the current study, errors across the 24 items in each subtest (child and adult) were tallied for each child to create a total error score for adult paralanguage (DANVA2-AP) and child paralanguage (DANVA2-CP). Scores were then standardized using age-based norms available in the manual. Specifically, z-scores for each child were computed by subtracting the population mean error from each child’s error score and dividing by the population standard deviation. Z-scores have a mean of zero and standard deviation of one, meaning that a score of zero indicates no difference from the population mean (i.e., average number of errors made by same-aged children). Scores below zero indicate fewer errors than the population mean, and thus, scores above zero indicate more errors than the population mean. Scores above or below one standard deviation of the mean (i.e., a score equal to or greater than -1 or +1) represent a clinically significant deviation from the mean (i.e., more errors than one would expect for a child that age). There are no minimum or maximum possible scores.

Two different types of DANVA2 scores were computed: z-scores and percentage of error scores. First, z-scores were computed for each child on each subtest. As previously described, the standard score provided information on how the emotion recognition abilities of the current
sample compare to same-aged peers (i.e., whether or not the mean of the current sample fell within one standard deviation of the normative mean for each subtest).

Next, the pattern of errors within each subtest were examined to create a DANVA2 percentage of error variable for each emotion (happy, sad, angry, fearful). Norm-referenced scores do not exist for emotion error rates, and thus, these scores were used for within-subject comparison purposes only. Percentage of error scores are provided in the DANVA2 scoring software for each participant and represent a continuous measure (min = 0, max = 100) of errors made on each emotion type. For the current study, the percentage of errors for happy and angry stimuli (across all four DANVA2 subtests) were used in statistical analyses.

Reliability and validity data on the DANVA2 are outlined in the manual (Nowicki, 2004). The mean internal consistency estimates for the DANVA2 paralanguage tasks are reported to be acceptable ($\alpha = .76$ for adult stimuli; $\alpha = .77$ for child stimuli), with test-retest reliability coefficients ranging from $r = .83$ (adult stimuli) to $r = .74$ (child stimuli; Nowicki, 2004). It has been documented that scores on facial emotion recognition and paralanguage tasks are highly related to social competence in children (Nowicki & Duke, 1992; 1994; Saarni, 1990), which provides evidence for convergent validity. Studies have also found that scores on the DANVA2 are unrelated to general cognitive abilities, which is evidence of discriminant validity (Nowicki, 2004). It should be noted that details regarding the ethnic and racial composition of facial and paralanguage stimuli were not provided in the DANVA2 manual. Informal visual and auditory inspection by the primary investigator of the current study indicated that stimuli were predominantly Caucasian, and English was the primary language spoken (non-English accents were not detected).
Given the extensive number of measures in the current study, a detailed list of all measures is provided in the table below.

<table>
<thead>
<tr>
<th>Measure Name (Acronym)</th>
<th>Author(s), Date Published</th>
<th>Construct Assessed</th>
<th>Format</th>
<th># of items</th>
<th>Age Range</th>
<th>Type of Scores (Normative Data Available for comparison purposes?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective Mutism Questionnaire (SMQ)</td>
<td>Bergman, 2008</td>
<td>Selective Mutism Symptoms (Frequency of Speech)</td>
<td>Parent Questionnaire</td>
<td>23</td>
<td>3 to 11</td>
<td>Raw mean scores (No)</td>
</tr>
<tr>
<td>School Speech Questionnaire (SSQ)</td>
<td>Bergman, 2002</td>
<td>Selective Mutism Symptoms (Frequency of Speech)</td>
<td>Teacher Questionnaire</td>
<td>8</td>
<td>3 to 11</td>
<td>Raw mean scores (No)</td>
</tr>
<tr>
<td>Social Skills Improvement System, Rating Scales (SSIS-RS); Teacher &amp; Parent Versions, Social Skills Scale (7 Subscales)</td>
<td>Gresham &amp; Elliot, 2008</td>
<td>Social Skills</td>
<td>Behaviour Rating Scales</td>
<td>46 (6-7 items per subscale)</td>
<td>3 to 18</td>
<td>Social Skills Scale = Standard scores (Yes) Subscales = Raw scores (No)</td>
</tr>
<tr>
<td>A Developmental Neuropsychological Assessment, Second Edition (NEPSY-II); Affect Recognition Subtest</td>
<td>Korkman, Kirk, &amp; Kemp, 2007</td>
<td>Emotion Recognition (Facial Expression)</td>
<td>Direct Assessment</td>
<td>35</td>
<td>3 to 16</td>
<td>Scaled scores (Yes)</td>
</tr>
<tr>
<td>Diagnostic Analysis of Nonverbal Accuracy Scale, Second Edition (DANVA2)</td>
<td>Nowicki &amp; Duke, 1994</td>
<td>Emotion Recognition (Facial Expression &amp; Paralanguage)</td>
<td>Direct Assessment</td>
<td>24 per subtest (96 total)</td>
<td>3 to 100</td>
<td>Total Error z-scores (Yes) &amp; Emotion Error scores (No)</td>
</tr>
</tbody>
</table>
Results

Preliminary Analyses

**Missing Data.** Prior to examining the primary hypotheses, data were checked for consistency and accuracy. Due to the fact that data from children and parents were collected in the hospital setting, very few missing data points were observed (less than five percent), with the exception of the “Interpersonal Relationships” section of the ADIS-IV where 11 to 20 percent of responses were missing. Informal conversations with examiners revealed that they often forgot to ask the question due to the formatting of the document. All valid measures with missing responses on the SSIS-RS were imputed according to the values outlined in the manual. No missing responses existed for the DANVA2 or NEPSY-II measures. Guidelines do not exist for missing data on the SMQ and SSQ, and thus procedures outlined in a recent SM publication were followed: scores on the SMQ and SSQ were computed as the mean of the valid items, if at least half the items were considered valid (Oerbeck, Stein, Pripp, & Kristensen, 2015). As previously mentioned, several measures were not administered due to the child’s young age (DANVA2) and/or lack of enrollment in formal education (SSQ, SSIS-TRS). This accounted for a total of three participants, and thus, the total possible sample size for comparison using those measures was 28 rather than 31. A missing values analysis indicated that Little’s (1988) test of Missing Completely at Random (MCAR) was not significant, $\chi^2 = 38.767$, DF = 50, $p = .88$, providing support that data were missing completely at random, and thus, imputation techniques were undertaken. Multiple imputation is a method for estimating missing data based on probabilistic simulations methods. Imputation techniques were conducted and results indicated no significant differences when comparing pre- and post-imputation mean scores, and thus, missing values were excluded pairwise when applicable.
The means, standard deviations, skewness, kurtosis and reliability indices are provided for each measure in Table 2 below. Also presented in Table 2 are the number of subjects that completed each measure, out of the total sample of 31 children who participated in the study.

Table 2
Descriptive statistics

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>n</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>α</th>
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<tr>
<td>Selective Mutism Questionnaire (SMQ)</td>
<td>30</td>
<td>.18</td>
<td>2.07</td>
<td>.95</td>
<td>.44</td>
<td>.61</td>
<td>- .17</td>
<td>.86</td>
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<td>School Speech Questionnaire (SSQ)</td>
<td>25</td>
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<td>1.5</td>
<td>.63</td>
<td>.56</td>
<td>.34</td>
<td>- 1.49</td>
<td>.82</td>
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<tr>
<td>Social Skills Improvement System – Teacher Rating (SSIS-TRS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Skills Scale</td>
<td>25</td>
<td>48.00</td>
<td>107.00</td>
<td>73.80</td>
<td>14.51</td>
<td>.12</td>
<td>- .41</td>
<td>.89</td>
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<tr>
<td>Communication Subscale</td>
<td>25</td>
<td>.00</td>
<td>1.83</td>
<td>.78</td>
<td>.62</td>
<td>.31</td>
<td>-1.30</td>
<td>.75</td>
</tr>
<tr>
<td>Cooperation Subscale</td>
<td>25</td>
<td>1.33</td>
<td>3.00</td>
<td>2.28</td>
<td>.41</td>
<td>-1.18</td>
<td>-2.28</td>
<td>.53</td>
</tr>
<tr>
<td>Assertion Subscale</td>
<td>25</td>
<td>.00</td>
<td>2.00</td>
<td>.51</td>
<td>.54</td>
<td>1.34</td>
<td>1.47</td>
<td>.85</td>
</tr>
<tr>
<td>Responsibility Subscale</td>
<td>25</td>
<td>1.17</td>
<td>2.83</td>
<td>2.12</td>
<td>.51</td>
<td>-1.19</td>
<td>-1.16</td>
<td>.77</td>
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<tr>
<td>Empathy Subscale</td>
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<td>.00</td>
<td>2.83</td>
<td>1.28</td>
<td>.77</td>
<td>.36</td>
<td>- .50</td>
<td>.84</td>
</tr>
<tr>
<td>Engagement Subscale</td>
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<td>.29</td>
<td>2.00</td>
<td>.82</td>
<td>.51</td>
<td>.75</td>
<td>- .37</td>
<td>.67</td>
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<tr>
<td>Self-Control Subscale</td>
<td>25</td>
<td>.00</td>
<td>2.43</td>
<td>1.37</td>
<td>.55</td>
<td>.04</td>
<td>.72</td>
<td>.71</td>
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<tr>
<td>Social Skills Scale – Parent Rating (SSIS-PRS)</td>
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<tr>
<td>Social Skills Scale</td>
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<td>56.00</td>
<td>118.00</td>
<td>79.24</td>
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<td>.97</td>
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<td>.72</td>
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<tr>
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<td>3.00</td>
<td>2.11</td>
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<td>-.28</td>
<td>-.22</td>
<td>.78</td>
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<td>Assertion Subscale</td>
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<td>1.54</td>
<td>.55</td>
<td>.11</td>
<td>.43</td>
<td>.73</td>
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<tr>
<td>Responsibility Subscale</td>
<td>30</td>
<td>1.17</td>
<td>2.83</td>
<td>2.00</td>
<td>.47</td>
<td>.32</td>
<td>-.84</td>
<td>.80</td>
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<tr>
<td>Empathy Subscale</td>
<td>30</td>
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<td>.54</td>
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<td>.90</td>
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<tr>
<td>Engagement Subscale</td>
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<td>.75</td>
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<tr>
<td>Self-Control Subscale</td>
<td>30</td>
<td>.00</td>
<td>2.43</td>
<td>1.37</td>
<td>.55</td>
<td>.04</td>
<td>.72</td>
<td>.82</td>
</tr>
<tr>
<td>A Developmental Neuropsychological Assessment (NEPSY-II); Affect Recognition Subtest</td>
<td>31</td>
<td>3.00</td>
<td>14.00</td>
<td>9.45</td>
<td>2.68</td>
<td>-.93</td>
<td>.56</td>
<td>.87</td>
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<td>Diagnostic Analysis of Nonverbal Accuracy (DANVA2)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Adult Faces</td>
<td>26</td>
<td>- .37</td>
<td>2.30</td>
<td>.62</td>
<td>.80</td>
<td>.76</td>
<td>-.26</td>
<td>.67</td>
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<tr>
<td>Child Faces</td>
<td>26</td>
<td>- .65</td>
<td>3.56</td>
<td>.83</td>
<td>.97</td>
<td>1.22</td>
<td>1.63</td>
<td>.51</td>
</tr>
<tr>
<td>Adult Paralanguage</td>
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<td>.99</td>
<td>-.57</td>
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<td>.50</td>
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<tr>
<td>Child Paralanguage</td>
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<td>2.07</td>
<td>.36</td>
<td>.81</td>
<td>.52</td>
<td>-.49</td>
<td>.47</td>
</tr>
</tbody>
</table>
**Internal Consistency.** Internal consistency estimates indicate varying levels of reliability, with Cronbach’s alpha coefficients ranging from $\alpha = .82$ to $\alpha = .89$ across rating scales, and $\alpha = .47$ to $\alpha = .87$ across direct measures within the current sample (see Table 3). The observed alpha levels in the current sample are lower compared to some reported estimates of alpha using the DANVA2 (e.g., $\alpha = .88$; Baron-Cohen, Lombardo, & Tager-Flusberg, 2013), but consistent with others (e.g., $\alpha = .67$, DANVA2 - Child Faces; Pugliese, 2014). Moreover, current results are consistent with reported alphas from a variety of similar measures of nonverbal decoding tasks, which are historically weak (e.g., median $\alpha = .21$) in internal consistency (Baron-Cohen, Lombardo, & Tager-Flusberg, 2013, p. 107). Minimum sample sizes for stable and accurate alpha levels are debated in the literature. However, 200 to 500 is a commonly suggested minimum sample size for a robust estimate of the population (Yurdugul, 2008). It is plausible that estimates in the current sample are low due to the sample size ($n = 26$). Other potential reasons for a low value of alpha include poor interrelatedness of items or heterogeneity of the construct (Tavakol & Dennick, 2011).

Scales with alpha values below .7 are often labelled as having “poor” internal consistency (e.g., Kline, 1999). However, Field (2013) purports that one score is insufficient in understanding reliability of a scale and guidelines for interpreting alpha should not result in complete abandonment of the measures nor deter researchers from further exploration. Item-total statistics and inter-item correlations were explored; no substantial changes in alpha were observed if items were deleted. Accordingly, all items were retained for primary analyses and findings based on less reliable measures were interpreted with caution.

**Assumption Checking.** The assumptions of parametric tests used to test hypotheses in the current study are based on the assumptions of (a) approximately normal sampling
distributions, (b) linearity, (c) homoscedasticity, and (d) independence of errors (Field, 2013). Violations to the aforementioned assumptions can increase bias in the results, leading to inflation of Type I errors (erroneously rejecting the null hypothesis when it is true) or Type II errors (erroneously retaining the null hypothesis when it is false; Field, 2013).

**Normal Distribution.** According to Kim (2013), the best approach to examine whether or not the level of normality is acceptable is a “combination of visual inspection, assessment using skewness and kurtosis, and formal normality tests” (p. 54). Histograms, Q-Q plots and box plots were used to visually inspect values for each variable. Skewness and kurtosis were measured in order to examine the symmetry and peakedness of the distributions; no significant values (i.e., $\geq \pm/2$) were observed (see Table 2 for details). Box plots were used to examine the spread of the data and no significant outliers (values greater than three standard deviations above or below the mean) were observed.

Results from visual inspection and Shapiro-Wilk tests of normality indicated that the assumption of normality could be maintained for all variables with the exception of the SSQ and the NEPSY-II. A “Log10” transformation improved normality of the SSQ, accordingly the transformed scores were used in all subsequent analyses. Transformations for the NEPSY-II were not indicated due to the need to retain scaled scores (otherwise comparisons to the normative group could not be conducted). Further inspection of the NEPSY-II data revealed that the scores did not function as expected for a continuous measure, but rather the standard scores fell in to discrete categories: one-third of participants achieved a scaled score of 9 or below, one-third achieved a scaled score of 10 (population mean), and one third achieved a scaled score of 11 or higher (see Appendix C for details).
Given that these distinct categories are not clinically meaningful, and all fall within the “Average” range, overall scaled scores on the NEPSY-II were excluded from further analyses.

**Linearity & Homoscedasticity.** Scatterplots were examined for relationships among the variables of interest; no violations of the assumptions of linearity and homoscedasticity were observed (Pallant, 2007). Data were also examined for extreme values; no influential data points were observed, and thus, no scores were removed and/or altered.

**Independence.** Data for each participant were collected independently in order to increase confidence in estimates of standard errors in the model, and thus, the accuracy of statistical analyses. No relationships among participants were reported, with the exception of one set of twins. Data for the twins were collected separately; parents provided information via rating scales separately (i.e., father completed scale for one child, mother for the other in different rooms) in order to minimize potential bias. Correlational analyses were conducted as preliminary analyses to examine the strength and direction of the relationship among measures of similar constructs, and to ensure that measures of similar constructs were related without being redundant (i.e., remain independent). It should be noted that the focus of the preliminary correlational analyses was to determine the magnitude and direction of the relationships within measures of similar constructs. Specifically, the relationships between (1) parent and teacher ratings of selective mutism symptoms, (2) direct measures of emotion recognition across all four tasks, and (3) parent and teacher ratings of social skills, were examined. The specific relationships across measures of SM symptoms (SMQ, SSQ), emotion recognition abilities (DANVA2), and social skills (SSIS-RS, parent and teacher) were explored as “Primary Analyses” (Research Questions #4-6), and thus, results from such questions are outlined in the section to follow.
Overall, results from preliminary correlational analyses indicated significant relationships among most measures of the same construct (i.e., parent and teacher reports of selective mutism symptoms; subtests on the DANVA2), evidencing good construct validity. Specifically, teacher and parent ratings of a child’s frequency of speech, as measured by the SMQ and SSQ, respectively, were moderately and positively correlated ($r = .56, p < .05$) indicating that parents and teachers reported statistically significantly similar SM symptoms in children. Nearly all measures of emotion recognition across the four DANVA2 subtests were positively and moderately correlated with each other (see Table 3), with the exception of a nonsignificant correlation between adult faces (DANVA2-AF) and child voices (DANVA2-CF; $r = .27, = .19$) suggesting that these tasks may be measuring somewhat distinct abilities.

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Emotion Recognition, Adult Faces (DANVA2 – AF)</td>
<td>-</td>
<td>.624*</td>
<td>.412*</td>
<td>.268</td>
</tr>
<tr>
<td>2. Emotion Recognition, Child Faces (DANVA2 – CF)</td>
<td>-</td>
<td></td>
<td>.548*</td>
<td>.418*</td>
</tr>
<tr>
<td>3. Emotion Recognition, Adult Paralanguage (DANVA2 – AP)</td>
<td>-</td>
<td></td>
<td></td>
<td>.484*</td>
</tr>
<tr>
<td>4. Emotion Recognition, Child Paralanguage (DANVA2 – CP)</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$ (2-tailed).

Finally, parent and teacher ratings of children’s social skills (SSIS-PRS & TRS, respectively) were not statistically significantly related ($r = .26, p = .22$), indicating that parents and teachers observed differing patterns of social skills in children with SM.  

**Primary Statistical Analyses**

For the primary statistical analyses, descriptive statistics and detailed information regarding the interpersonal functioning (as reported by parents during the ADIS-IV) are first
provided to gain a broader understanding of how parents describe the quality of peer relationships and frequency of peer engagement in children with SM. A series of one-sample, two-tailed z-tests were then conducted, comparing parent and teacher ratings of social skills of children with SM in the current sample to the normative population. These analyses were conducted to determine whether results from three previous SM studies, indicating that children with SM have social skill problems (Carbone et al., 2010; Cunningham et al., 2004, 2006), were replicable in the current sample. In order to better understand parent and teacher ratings of social skills, follow-up paired sample t-test were conducted in order to analyze differences across parent and teacher ratings of social skill subscales.

Next, the emotion recognition abilities of children with SM were examined using z-tests. Follow-up t-tests were conducted to determine the whether the type of emotion depicted (i.e., threatening versus non-threatening) on emotion recognition stimuli contributed to the pattern of observed errors. Effect sizes are reported for all mean comparisons (e.g., t-test, z-tests). Finally, a series of correlational analyses were conducted to determine the magnitude and direction of relationships among variables of interest. Exploring the relationships between social skills, emotion recognition abilities, and selective mutism symptoms were of primary interest due to the fact that no other study to date has extensively explored the social-emotional competencies in children with SM. It should also be noted that z-tests rather than one-sample t-tests were conducted for most primary analyses due to the fact that population means and standard deviations were known (the values are approximated for t-tests). The recommended sample size for z-tests is 30, which is only slightly larger than the sample size of 26 on most emotion recognition measures.
Due to the exploratory nature of the study, and the limited power to detect small effect sizes, a \( p \)-value of .05 without the use of Bonferroni corrections was used across statistical analyses to identify statistical significance. All analyses were completed using *IBM SPSS* (v. 25) software. The presentation of results for the current study are organized by research question. Research questions are first presented, followed by the results from relevant analyses.

**Research Question #1: How Do Parents Describe the Interpersonal Relationships of Children with SM?**

Results from frequency metrics across forced-choice questions on the “Interpersonal Relationships” section of the ADIS-IV indicated that most parents reported that children with SM tended to have “fewer friends than most kids” (64.3%), and “had trouble making friends” (71.4%). However, parents also reported that nearly all children preferred not to play alone (92.6%), indicating a desire to be social. Most children also had a best friend (67.9%), indicating the ability to form and retain close friendships (see Table 4 for details).

<table>
<thead>
<tr>
<th>Response Item</th>
<th>Yes (%)</th>
<th>No (%)</th>
<th>Other (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child has fewer friends compared to other children their age.</td>
<td>64.3% (fewer)</td>
<td>28.6% (same #)</td>
<td>7.1% (more)</td>
</tr>
<tr>
<td>Child has a best friend.</td>
<td>67.9%</td>
<td>32.1%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Child has trouble making friends.</td>
<td>71.4%</td>
<td>28.6%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Child has trouble keeping friendships.</td>
<td>39.3%</td>
<td>53.6%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Child prefers to play alone rather than with other children.</td>
<td>3.7%</td>
<td>92.6%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Child belongs to a club/plays on a team.</td>
<td>59.3%</td>
<td>40.7%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

*Note:* Valid percentages are displayed; an average of 11% of items were missing (SD 1%)
In regard to peer engagement, most parents responded that their child plays with friends a moderate amount, meaning approximately once or twice per week (32.2%) or once or twice per month (19.4%, see Table 5). Fewer parents indicated extreme disengagement or engagement, meaning their child never or rarely sees friends outside of school (16.1%), or very frequently (more than twice a week; 12.9%).

Table 5

<table>
<thead>
<tr>
<th>Frequency of peer engagement outside of school (n = 27)</th>
<th>Percentage of Parents Endorsing Item (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never or Rarely</td>
<td>16.1%</td>
</tr>
<tr>
<td>1 or 2/month</td>
<td>19.4%</td>
</tr>
<tr>
<td>1 or 2/wk</td>
<td>32.2%</td>
</tr>
<tr>
<td>2+/wk</td>
<td>12.9%</td>
</tr>
<tr>
<td>Missing</td>
<td>19.4%</td>
</tr>
</tbody>
</table>

Research Question #2: Do Children with SM have Greater Social Skill Difficulties, as Reported by Parents and Teachers on Norm-Referenced Measures, Compared to a Normative Sample?

Results from two one-sample z-tests comparing children with SM with a normative sample on the total standard scores on the SSIS-RS Social Skills scale indicated that both parents ($M = 79.24, SD = 14.45; z (29) = - 7.60, p < .05$) and teachers ($M = 73.80, SD = 14.51; z (24) = - 8.73, p < .05$) rated children with SM as having significantly lower social skills compared to other children their age. The absolute values of the effect sizes for these analyses ($d = - 1.39$, parent ratings; $d = - 1.75$, teacher ratings) were found to exceed Cohen’s (1988) convention for a large effect ($d = .80$). Parent and teacher ratings of children with SM on the SSIS-RS fell
between 70 and 85, within the “Below Average” interpretive range, according the SSIS-RS manual (Gresham & Elliot, 2008).

The standard scores obtained for each child on Social Skills Scale were derived from comparing their raw score to an age-based norm, which then allowed for comparing scores across age groups. In contrast, the Social Skills subscales on the SSIS-RS were then analyzed to better understand the differences across various aspects of social skills. The manual does not provide standardized scores for subscales; rather, clinical classifications are provided based on frequency counts, and thus, mean percentage ratings of children falling in clinical classifications (i.e., “Below Average”, “Average” or “Above Average”) according to parent and teacher report are presented (see Table 6 for details). Results indicated that most children with SM (greater than 60% of the sample) were reported by parents and teachers to have “Below Average” functioning in the following areas: Communication (e.g., “says please”), Assertiveness (teacher report only; e.g., “stands up for him/herself when treated unfairly”), and Engagement (e.g., “makes friends easily”). Approximately ninety-percent of parents and teachers rated the area of “Engagement” as “Below Average”, which reflects low scores on items such as “makes friends easily” as well as “starts conversations with peers”.

Table 6

<table>
<thead>
<tr>
<th>SSIS-RS Social Skill Subscales</th>
<th>Parent Rating</th>
<th>Teacher Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Below Average</td>
<td>% Average</td>
</tr>
<tr>
<td>Communication</td>
<td>62.1</td>
<td>37.9</td>
</tr>
<tr>
<td>Cooperation</td>
<td>13.8</td>
<td>75.9</td>
</tr>
<tr>
<td>Assertiveness</td>
<td>48.3</td>
<td>48.3</td>
</tr>
<tr>
<td>Self-Control</td>
<td>31.0</td>
<td>62.1</td>
</tr>
<tr>
<td>Engagement</td>
<td>89.7</td>
<td>10.3</td>
</tr>
<tr>
<td>Empathy</td>
<td>44.8</td>
<td>48.3</td>
</tr>
<tr>
<td>Responsibility</td>
<td>13.8</td>
<td>75.9</td>
</tr>
</tbody>
</table>
Seven paired sample t-tests comparing parent and teacher mean raw scores on each Social Skill subscale were then conducted to determine whether observed differences between parents and teacher ratings across subscales were statistically significant. Results indicated that teachers rated children with SM as having statistically significantly poorer skills across “Communication”, “Assertiveness”, and “Empathy” subscales compared to parents (see Table 7).

<table>
<thead>
<tr>
<th>SSIS-RS Social Skill Subscales</th>
<th>Teacher Mean (SD)</th>
<th>Parent Mean (SD)</th>
<th>Mean Difference (SD)</th>
<th>t-value</th>
<th>p-value</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>.79 (.62)</td>
<td>1.57 (.52)</td>
<td>-.79 (.84)</td>
<td>-4.66</td>
<td>.000*</td>
<td>.93</td>
</tr>
<tr>
<td>Cooperation</td>
<td>2.29 (.41)</td>
<td>2.1 (.50)</td>
<td>.19 (.54)</td>
<td>1.79</td>
<td>.086</td>
<td>.35</td>
</tr>
<tr>
<td>Assertiveness</td>
<td>.50 (.55)</td>
<td>1.55 (.59)</td>
<td>-1.05 (.85)</td>
<td>-6.33</td>
<td>.000*</td>
<td>1.23</td>
</tr>
<tr>
<td>Self-Control</td>
<td>1.42 (.70)</td>
<td>1.37 (.57)</td>
<td>.05 (.75)</td>
<td>.32</td>
<td>.752</td>
<td>.07</td>
</tr>
<tr>
<td>Engagement</td>
<td>.82 (.52)</td>
<td>.76 (.54)</td>
<td>.06 (.73)</td>
<td>.42</td>
<td>.678</td>
<td>.08</td>
</tr>
<tr>
<td>Empathy</td>
<td>1.32 (.76)</td>
<td>1.85 (.66)</td>
<td>-.54 (.83)</td>
<td>-3.16</td>
<td>.004*</td>
<td>.642</td>
</tr>
<tr>
<td>Responsibility</td>
<td>2.13 (.52)</td>
<td>2.05 (.49)</td>
<td>.09 (.57)</td>
<td>.756</td>
<td>.457</td>
<td>.14</td>
</tr>
</tbody>
</table>

**Research Question # 3: Do Children with SM Make More Errors on Norm-Referenced Measures of Social Information Processing (Emotion Recognition) Compared to the Normative Sample?**

Results from four one-sample z-tests, comparing the mean z-scores of the current sample to the known population mean \( (M = 0, SD = 1) \), indicated that children with SM made significantly more errors across all facial affect recognition tasks on the DANVA2 compared to same-aged peers \( (p < .05) \). Specifically, children with SM made more errors labelling emotions on adult faces (DANVA-AF; \( M = .60, SD = .80; z (26) = 3.16, p < .05, d = .62 \)) and child faces (DANVA2-CF; \( M = .83, SD = .97; z (26) = 4.23, p < .05, d = .83 \)). The effect sizes for these
analyses \((d = .62\) for adult faces, and \(d = .83\) for child faces) are considered medium to large (Cohen’s, 1988).

In contrast, results of analyses comparing children with SM with same age peers on paralanguage skills, indicated no statistically significant differences for either child (DANVA2-CP) or adult voices (DANVA2-AP). Details from the analyses are outlined below (see Table 8).

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>(n)</th>
<th>Mean (SD)</th>
<th>(z)-value</th>
<th>(p)-value</th>
<th>Cohen’s (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANVA2 - Adult Faces</td>
<td>26</td>
<td>.62 (.80)</td>
<td>3.16</td>
<td>.002*</td>
<td>.62</td>
</tr>
<tr>
<td>DANVA2 – Child Faces</td>
<td>26</td>
<td>.83 (.97)</td>
<td>4.23</td>
<td>.000*</td>
<td>.83</td>
</tr>
<tr>
<td>DANVA2 – Adult Paralanguage (Voices)</td>
<td>26</td>
<td>-.09 (.99)</td>
<td>-0.46</td>
<td>.646</td>
<td>-.09</td>
</tr>
<tr>
<td>DANVA2 – Child Paralanguage (Voices)</td>
<td>26</td>
<td>.36 (.81)</td>
<td>1.84</td>
<td>.067</td>
<td>.36</td>
</tr>
</tbody>
</table>

**Research Question #4: Do Children with SM Make More Errors on Threatening (e.g., Angry) Faces Compared to Non-threatening Stimuli (e.g., Happy Faces) Depicted on Standardized Measures of Emotion Expression?**

A series of four, paired samples \(t\)-tests were used to compare the percentage of errors children made in recognizing happy versus angry stimuli across each of the four DANVA2 emotion recognition tasks. Results indicated statistically significant differences in both directions when comparing the percentage of errors on happy to angry items for child faces \((M = -48.7, SD = 24.23)\), adult faces \((M = -27.3, SD = 21.25)\), and child voices \((M = 17.0, SD = 21.19)\), with large effect sizes observed \((p < .05\), see Table 8 for details). These results suggest that children with SM respond differentially to items as a function of the emotion depicted, making more errors on angry items compared to happy items across facial emotion recognition tasks. As hypothesized, children with SM would have greater difficulty with threatening compared to
nonthreatening items. The one exception here is that on child paralanguage tasks, children with SM were found to make more errors on happy items compared to angry items ($M = 17.0$, $SD = 21.9$), which adds to the findings that children functioned differently across paralanguage and facial emotion recognition tasks both in the amount of errors they made and the types of errors.

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Happy Mean % Errors (SD)</th>
<th>Angry Mean % Errors (SD)</th>
<th>Mean % Error Difference (SD)</th>
<th>$t$-value</th>
<th>$p$-value</th>
<th>Cohen’s $d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANVA2 - Adult Faces</td>
<td>8.60 (9.16)</td>
<td>35.85 (15.58)</td>
<td>-27.3 (21.25)</td>
<td>-6.665</td>
<td>.000*</td>
<td>1.28</td>
</tr>
<tr>
<td>DANVA2 – Child Faces</td>
<td>5.37 (8.15)</td>
<td>54.11 (19.06)</td>
<td>-48.7 (24.23)</td>
<td>-10.452</td>
<td>.000*</td>
<td>2.01</td>
</tr>
<tr>
<td>DANVA2 – Adult Paralanguage (Voices)</td>
<td>20.44 (13.31)</td>
<td>23.59 (11.56)</td>
<td>-3.2 (17.80)</td>
<td>-.919</td>
<td>.367</td>
<td>.18</td>
</tr>
<tr>
<td>DANVA2 – Child Paralanguage (Voices)</td>
<td>27.15 (13.4)</td>
<td>10.11 (11.60)</td>
<td>17.0 (21.19)</td>
<td>4.179</td>
<td>.000*</td>
<td>.81</td>
</tr>
</tbody>
</table>

**Research Question #5: Is There a Relationship Between the Degree of SM Symptoms and Errors on Direct Measures of Emotion Recognition?**

A series of bivariate Pearson product-moment correlational analyses were conducted between raw scores on parent and teacher ratings of frequency of speech (SMQ, SSQ) and z-scores on the DANVA2. Results indicated no significant relationship between parent and teacher reports of SM symptoms and errors on direct measures of emotion recognition ($p > .05$; see Table 10). Results are inconsistent with the hypothesis that there would be a negative and significant relationship between frequency of speech and errors on direct measures of emotion recognition.
### Table 10

*Correlations between measures of selective mutism and emotion recognition (n = 26)*

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Selective Mutism Questionnaire (SMQ)</th>
<th>School Speech Questionnaire (SSQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANVA2 Adult Faces (DANVA2 – AF)</td>
<td>-.275</td>
<td>-.181</td>
</tr>
<tr>
<td>DANVA2 Child Faces (DANVA2 – CF)</td>
<td>.148</td>
<td>-.170</td>
</tr>
<tr>
<td>DANVA2 Adult Paralanguage (DANVA2 – AP)</td>
<td>-.059</td>
<td>-.201</td>
</tr>
<tr>
<td>DANVA2 Child Paralanguage (DANVA2 – CP)</td>
<td>.301</td>
<td>-.299</td>
</tr>
</tbody>
</table>

* * p < .05 (2-tailed).

### Research Question #6: Is There a Relationship Between Reported Social Skills and Emotion Recognition Abilities in Children with SM?

A series of bivariate, Pearson product-moment correlational analyses were conducted between standard scores on parent and teacher social skills ratings (SSIS-RS) and z-scores on the DANVA2. Results indicated no statistically significant relationship between parent and teacher reports of social skills and errors on direct measures of emotion recognition (p > .05; see Table 8). The one exception here was a moderate and negative correlation, \( r = -.43, n = 26, p < .05 \), between parent rating of social skills (as measured by the SSIS-PRS) and errors labelling the emotional expressions on child faces (as measured by the DANVA2-CF). The observed relationship is consistent with the hypothesis that high levels of reported social skill would be negatively and significantly related to emotion recognition errors.
Table 11

*Correlations between measures of emotion recognition and social skills (n = 26 to 29)*

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Social Skills Parent Rating (SSIS-PRS)</th>
<th>Social Skills Teacher Rating (SSIS-TRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANVA2, Adult Faces (DANVA2 – AF)</td>
<td>-.318</td>
<td>-.250</td>
</tr>
<tr>
<td>DANVA2, Child Faces (DANVA2 – CF)</td>
<td>-.426*</td>
<td>-.206</td>
</tr>
<tr>
<td>DANVA2, Adult Paralanguage (DANVA2 – AP)</td>
<td>-.300</td>
<td>-.223</td>
</tr>
<tr>
<td>DANVA2, Child Paralanguage (DANVA2 – CP)</td>
<td>-.397</td>
<td>-.235</td>
</tr>
</tbody>
</table>

* p < .05 (2-tailed).

**Research Question #7: Is There a Relationship Between Reported SM Symptoms and Reported Social Skills?**

Results from a series of bivariate correlation analyses using the Pearson product-moment coefficient indicated no statistically significant relationship between parent and teacher reports of social skills and selective mutism symptoms (p > .05; see Table 9), with the exception of a large and positive correlation, r = .63, n = 21, p < .05, between teacher ratings of selective mutism symptoms (as measured by the SSQ) and social skills (as measured by the SSIS-TRS). Therefore, higher ratings of frequencies of speech are associated with higher levels of social skills, as observed by teachers.

Table 12

*Correlations between measures of selective mutism and social skills (n = 25 to 30)*

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Social Skills, Parent Rating (SSIS-PRS)</th>
<th>Social Skills, Teacher Rating (SSIS-TRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective Mutism Questionnaire (SMQ)</td>
<td>-.086</td>
<td>.303</td>
</tr>
<tr>
<td>School Speech Questionnaire (SSQ)</td>
<td>.227</td>
<td>.632*</td>
</tr>
</tbody>
</table>

* p < .05 (2-tailed).
Discussion

In 2013, SM was classified as an anxiety disorder, yet relatively little is known about SM compared to other childhood anxiety disorders. In particular, very little research has been conducted on the social-emotional functioning of children with SM, despite evidence from initial studies documenting reported social skill problems (Carbone et al., 2010; Cunningham et al., 2004, 2006). Results from the present study extend the field of SM and anxiety disorders by offering a fuller understanding of the social lives of children aged 4 to 10 with SM using a multi-method, multi-informant assessment procedure.

First, in order to document the social functioning of children with SM, the present study used parent descriptions of interpersonal functioning from the ADIS-IV “Interpersonal Relationships” section to contextualize the information gleaned from direct measures and ratings scales. Nearly all parents (93%) reported that children with SM prefer to spend their time with other children evidencing a desire to be social. Further, children with SM tend to play with friends (at least once weekly or monthly), have best friends, and do not have trouble keeping friends. In contrast, most parents also stated that children with SM have trouble making friends and have fewer friends than most children. The general consensus among parents appears to be that most children with SM are capable of having solid friendships with peers; however, forming new friendships and expanding friendship networks may be particularly challenging. These results are consistent with reports on the social skills rating scale (SSIS-RS), where parents and teachers identified “Engagement” (the frequency of joining, interacting, and/or participating in play with peers) as a primary area of social difficulty. It is not clear how these interpersonal relationship characteristics directly compare to other children with anxiety, or non-anxious controls. However, the depiction of a child that desires to be social but has trouble joining groups
or making new friends is strikingly similar to a child with social anxiety, who are described as socially inclined but also withdrawn (e.g., Spence et al., 1999; Coplan & Ooi, 2013). The question remains regarding whether social engagement difficulties are a function of not knowing what to say (or how to say it) in order to be successful (i.e., competence) or solely an issue of performance anxiety.

In order to further explore the social skills of children with SM, the frequency of observed social behaviors were explored using parent and teacher ratings on the SSIS-RS. Consistent with previous studies, parents and teachers in the current study rated children with SM as having poorer social skills compared to same-aged peers. Specifically, parents’ and teachers’ ratings of children with SM reflected what is classified as “Below Average” social skills, meaning that, clinically and statistically, children with SM were viewed as having significant difficulties compared to the normative population. This replication of findings from Carbone and colleagues (2010), as well as Cunningham and colleagues (2004, 2006) provides evidence for the robustness of the results; children with SM are rated as having social skill problems across settings and samples. The current study also provided information about specific areas of social difficulties by examining the social skill subscales on the SSIS-RS. Most children with SM in the current sample were rated by parents and teachers as having “Below Average” functioning in the areas of “Communication”, “Assertiveness” (teacher report only), and “Engagement”, which are subscales on the SSIS-RS. Approximately ninety-percent of parents and teachers rated “Engagement” as “Below Average”, which reflects low scores on items such as “makes friends easily” and “interacts well with other children”. It is clear that both parents and teachers are reporting that children with SM have social skill problems.
Despite concordance between parents and teachers that children with SM have “Below Average” social skills, particularly when it comes to peer engagement, teachers rated children with SM as exhibiting more challenges in assertiveness (e.g., “stands up for him/herself when treated unfairly”), communication (e.g., “says please”), and empathy (e.g., “tries to comfort others”) compared to parents. Results from correlation analyses also indicated a non-statistically significant relationship between parent and teacher ratings of social skills. It is common for parents and teachers to have low to moderate agreement in their ratings of children across contexts, and the same appears to be true for children with SM. Parents, who have the broadest understanding of their child’s behavioral profile across contexts, are reporting their children have social skills problems and these problems are unrelated to the social skill difficulties teachers are observing at school, where anxiety levels are likely to be the most impairing. Differences in ratings of social skills across contexts is also consistent with the clinical presentation of children with SM, which is marked by changes in behavior (i.e., speaking) across contexts. It is understandable that teachers rated children with SM as having more social skills problems at school compared to parent ratings at home given the fact that school is the most common context for not speaking in children with SM. In summary, these findings suggest that children with SM have social difficulties across contexts, but that the type and/or degree of difficulties also vary depending on the context.

Despite the fact that parents and teachers report “Below Average” social skills, the degree to which performance anxiety may be impairing the use of the skills remains unclear. It is important to keep in mind that results from the rating scales offer information about the frequency in which parents and teachers observe children with SM using specific social skills, and thus, we cannot conclude that children with SM necessarily lack the skills. The evidence to
date supports that children with SM have social performance difficulties, but the question of whether or not children with SM have acquired the necessary skills to effectively engage socially with peers remains unanswered by previous studies. A consistent criticism of previous studies examining social functioning and SM is the reliance on social skill rating scales, particularly due to the fact that it is unclear how SM symptoms influence the rating of such skill. For example, it is not clear how not speaking may interfere with parent and teacher ratings of “engagement” on the SSIS-RS. Further, relying exclusively on social skill ratings scales is psychometrically unsound given that several of the subscales in the present study demonstrated low internal consistency. In an effort to address these limitations, the current study used multiple measures to examine social-emotional competencies in children with SM.

The use of direct measures of emotion recognition to better understand the social-information processing of children with SM is an important contribution to the literature made by the current study. Children with SM in the current study made more errors labelling facial expressions of emotions on both child and adult faces compared to children in the general population. Moreover, children with SM made significantly more errors on angry child and adult faces, compared to happy faces. Results from the emotion recognition tasks offer insight into the complicated investigation of a competence versus performance distinction. Children with SM made more errors on facial affect recognition tasks compared to same-aged peers, suggesting that performance difficulties may be related to underlying challenges in processing social information and acquiring developmentally typical skills. For example, a sensitive child who avoids threatening faces from a young age, such as angry faces depicting unpleasant arousal, may be less accurate in labelling that emotion when they are older. It stands to reason that selective avoidance of threatening information at encoding and interpretation stages of social information
processing would hinder skill development in the area of emotion recognition. Although the results from the present study do not directly test the model of anxious avoidance, it lends preliminary support and should be considered as a possibility. Further, it cannot be ruled out that errors in emotion recognition are not due to other factors that were not addressed in the present study (e.g., age, ethnicity, language differences; see “Limitations” section for further discussion).

It is hypothesized, however, that errors related to processing facial emotions of others may be related to overall patterns of anxious avoidance, which is common in closely related disorders (i.e., social anxiety) and central to the conceptualization of anxiety and selective mutism.

The model of anxious avoidance to threatening stimuli parallels the behavioral conceptualization of SM, where the lack of speech is understood as an anxious avoidant reaction to speech prompts. It is also consistent with Clark’s (1999) model of anxious avoidance for social anxiety disorder, a common comorbid diagnosis with SM (Muris & Ollendick, 2015). Clark (1999) proposed that socially anxious individuals demonstrate attention bias away from looking at other people, particularly threatening faces, and pay more attention to self rather than others when feeling anxious. Results from the current study are also consistent with previous research evidencing that youth with social anxiety disorder exhibit deficits in accurately labelling specific facial expressions of emotions, such as anger (Battaglia et al., 2004; Jarros et al., 2012).

Each of the findings in the present study regarding labelling the emotional expressions of faces had moderate to large effect sizes, indicating real-world significance. This is the first study to document that children with SM have difficulties processing social information, particularly at the initial stages of input and encoding, especially deficits in emotion recognition. Facial emotion recognition skills are important to overall social interactions, and thus, it is not surprising that parents and teachers are reporting problems with social engagement. The findings
that children with SM have trouble with a specific social-emotional skill, emotion recognition, is an important first step in understanding the complex social lives of children with SM. It helps researchers, clinicians, and affected parents and teachers to plan future research studies in order to better intervene.

Paralanguage, or tone of voice, was also examined and, contrary to hypotheses, results across paralanguage tasks were not consistent with results obtained for facial emotion recognition tasks in both the amount of errors and types of errors. Specifically, children with SM did not make more errors labelling the emotions reflected in child and adult voice samples compared to the normative sample. However, further analyses indicated that, when they did make errors, they were more likely to occur when labelling happy items compared to angry items.

The differences in results observed across facial and voice recognition tasks suggests that children process emotions differently depending on the modality of the perceptual stimuli. There is currently debate in the emotion processing literature regarding the independence the networks that process facial and voice stimuli (Adolphs, Tranel, & Damasio, 2001; Peelen, Atkinson, & Vuilleumier, 2010). Some authors contend that emotional processing is developmental, beginning with independent processing across modalities that moves towards a broader integration of modalities later in childhood and early adolescence (see Kuhn, 2014 for a review). Difficulties processing emotions in faces and not voices may also shed some light on the social behavioral patterns of children with SM. For example, discrepancies in interpretations of facial and auditory expressions of emotions in others may lead to greater confusion, fear, and/or avoidance of social situations. It could also be true that selective avoidance of faces (i.e., looking away), but not voices (i.e., continuing to listen, or hypervigilance to the conversation) causes
specific deficits in facial affect recognition, but not paralanguage. No causal information can be inferred from the results of the present study, but the potential real-world implications are clear: children with SM have social information processing difficulties. Although further research is needed, the present results confirm that a greater understanding of the relationships among emotion processing modalities in children with SM could have important implications for identifying appropriate foci for intervention.

In order to understand the relationship between the variables of social-emotional competence in children with SM, a series of correlational analyses were conducted between (1) emotion recognition and SM symptoms, (2) emotion recognition and social skills, and (3) SM symptoms and social skills. In contrast to study hypotheses, there were few significant correlations among measures of SM symptoms, social skills, and emotion recognition, which may be related to the sample size and limited power to detect small effects. However, two significant results from correlation analyses offer insight into the social lives of children with SM, as discussed next.

Parent ratings of social skills in the present study were negatively correlated with errors labelling emotional expressions on child faces, meaning that more errors labelling the emotional expressions on children’s faces were related to parent ratings of poorer social skills. This finding is particularly interesting given that no relationship was observed between parent ratings of SM and social skill or emotion recognition. Parents might be observing that children with SM have social skill difficulties unrelated to their lack of speech, but rather related to their difficulties identifying how same-aged peers feel. One can imagine how difficult it would be to engage in a group of peers if you had challenges accurately identifying how you would be received, which would be easiest to accomplish by looking at the faces of the children. This finding provides
initial evidence for the relationship between deficits in social information processing (i.e., emotion recognition) and social functioning in children with SM. What remains unclear is why the relationship was not evident within modalities (i.e., adult faces) and across raters (i.e., teacher ratings of social skills).

The second statistically significant correlation observed in the present study was between teacher ratings of social skills and teacher reports of frequency of speech, a major aspect of SM symptoms. That is, teacher ratings of overall social functioning declined as the frequency of speech at school decreased. This pattern of results was not true for parents; for parents, ratings of social skills were essentially unrelated to frequency of speech output. It should also be noted that unlike parents, teacher’s ratings of social skills were not related to emotion labelling problems. One explanation for the finding is that teacher reports of social skill problems in children with SM may be unduly influenced by a child’s mutism symptoms at school. Parent ratings of social skills may in fact be a more helpful indicator of whether or not a child with SM is having social skill problems. It makes sense that parents would have more opportunities to observe their child’s social abilities in contexts where they speak. Replication of these results are clearly needed. However, initial results suggest we need to listen closely to what parents are saying about children with SM: social engagement is particularly challenging for children with SM and this difficulty is not related to challenges speaking, but rather is related to problems identifying how their peers feel.

Summary. Overall, findings from the current study support previous research indicating that children with SM have social difficulties, although results are more nuanced that previously considered. In general, parents described children with SM as interested in engaging with peers, capable of developing close friendships, and participating in regular social engagements with
peers. However, most parents also reported that their child has fewer friends than other children and difficulty making new friends. Consistent with previous research, parents and teachers reported that children with SM have “Below Average” social skills. The social skill problems may be related to underlying deficits in a critical process of social-emotional competence -- emotion recognition. This is the first study to examine the emotion recognition abilities in children with SM, and results indicate difficulties labelling the facial emotion expressions of adults and children, with particular inaccuracies observed when labelling threatening (i.e., fearful) compared to nonthreatening (i.e., happy) facial expressions. These difficulties in emotion recognition, in turn, were associated with lower parent ratings of social skills, which is the first documentation of a relationship between input (i.e., labelling emotions on child faces) and behavioral output (i.e., social skills) in children with SM. In contrast, teacher ratings of social skills were more closely aligned with the children’s frequency of speech in school, and not to their ability to recognize emotions, which suggests that difficulties with both competence and performance may be contributing factors when evaluating the social-emotional functioning of children with SM. These findings highlight the important of measuring a multitude of constructs at various stages of social information processing in order to gain insight the social-emotional lives of children with SM. Difficulties at the earliest stages of social information processing can be detrimental to interpersonal functioning, and thus, the results from the present study have clinical implications, such as the importance of teaching children with SM how to accurately identify and label emotions, and provide a foundation for future research.

Strengths, Limitations & Future Directions

Strengths. The current study is the most extensive examination of social-emotional competence in children with SM to date. Relationships among SM symptoms and multiple areas
of social-emotional competence (emotion recognition, social skills) were explored for the first time, helping lay the groundwork for understanding unique characteristics of SM and social functioning. As previously discussed, studies of the social functioning of children with SM is particularly challenging, given the difficulties of assessing social skills in children with limited verbal expression. Not surprisingly, then, previous studies have relied heavily on behaviour ratings scales (Carbone et al., 2010; Cunningham et al., 2004, 2006; Longobardi et al., 2018). Extending this literature, the present study utilized behavior rating scales, semi-structured interviews and direct measures that did not require verbal responding to evaluate social and emotional functioning in children with SM. Results from this investigation helped elucidate that children with SM have difficulties processing certain social information, particularly facial expressions of emotion, that are needed in the earlier stages of social information processing (i.e., input/ recognition) and that are known to influence subsequent social behaviour (i.e., output; Crick & Dodge, 1994).

An additional strength of the present study is the use of well-established, standardized measures that are used as clinical tools, allowing for a comparison of children with SM in the current sample with other children their age. A common challenge in studying children with SM are small sample sizes, and thus, utilizing norm-referenced measures widely available in North American clinical settings, other researchers can begin to compare results from their samples in order to better understand the disorder. This is particularly important to demonstrate to academic and clinical communities who may be unaware of various methods of researching and assessing children with SM because of their limited speech output.

**Limitations.** Despite the strengths of the current study, several limitations warrant discussion. A limitation of the current study is the sample size, which had insufficient power to
detect a small to medium effect. Large samples of this relatively rare disorder, however, are not logistically possible, and thus, smaller sample sizes are common in SM literature (see Muris & Ollendick, 2015 for a review). The small sample size also made it impossible to consider variations as a function of demographic characteristics (age, gender, ethnicity), which are important considerations when studying differences across groups of children.

This was the first study to directly assess emotion recognition in children with SM. There are advantages and disadvantages to assessing social information processing skills (i.e., emotion recognition) in the context of a laboratory environment. Measures of emotion recognition provide information regarding a respondent’s ability to detect and label emotional information presented in a singular modality (face or tone of voice). Although these findings help to identify potential areas of concern for children with SM, results offer limited insight into how a child might struggle with further integration of the information from different modalities (tone of voice, faces) within a real-world context.

One drawback of assessing emotion recognition in children with SM in the context of a novel, and potentially anxiety-provoking setting (i.e., clinical setting) is that the findings may represent a performance difficulty (i.e., the results may be skewed by level of nervousness). Despite this drawback, results also provide clues about how children with SM may function in novel or uncomfortable social situations. Further, there are a variety of ways to measure emotion recognition other than errors in labelling, which was the primary metric considered in the present study. Although efforts were made to diversify the type of emotion recognition tasks employed, results from preliminary analyses on the NEPSY-II indicated that the measure was unsuitable for statistical analyses due to a non-normal distribution. Differences between the facial expression tasks on the DANVA2 and NEPSY-II that may account for these dissimilarities include the
number of items per subtest (i.e., DANVA2 = 24 items per subtest, NEPSY-II = 25 to 35 items, depending on the age of the subject), the demands of the task (DANVA2 = labelling four emotions, NEPSY-II = matching/recognizing six emotions), the type of stimuli (DANVA2 = child/adult, facial/paralanguage, NEPSY-II = child faces) and the type of scores used for analyses (DANVA2 = error z-scores, NEPSY-II = scaled scores).

Another limitation of the DANVA2 is that it is predominantly comprised of Caucasian and native English language speakers and does not provide multi-ethnic stimuli. This may be particularly relevant for the present study given inclusion of a significant minority (41.9%) of Asian participants. Analyses of the present study were unable to account for discrepancies between the child’s race/ethnicity and the testing stimuli, but the potential effects should not be discounted. Dr. Paul Ekman, a leading researcher in the field of emotional expressions, purports that facial expressions of emotions are universally expressed across cultures (see Ekman, 1993 for a review). Ekman (1993) also urges researchers to consider multiple modes of emotional expressions when conducting research by including measures of faces and voices. Paralanguage, or tone of voice, is particularly underexplored with regard to cultural variations. Results from the current study indicated different performances across facial and paralanguage modalities, which may be partially accounted for by variations in culture and exposure to the English language in the present sample. Despite the reliance on DANVA2 for emotion recognition results, the current study provides a starting point for understanding that children with SM have more difficulty when labelling angry compared to happy faces.

Lastly, inconsistent results from correlational analyses across raters (parent, teachers), scales (SM symptoms, social skills, emotion recognition) and modalities (faces, voices) make it difficult to generalize the results across settings. It is conceivable that the differences observed
offer important insights into the underlying patterns in the social-emotional difficulties of children with SM, but it is important to interpret the findings with caution. The selective nature of the disorder lends itself to presenting different impressions across contexts, particularly across school and home settings. Future research may need to address this specific limitation of measuring social-emotional functioning in children with SM across multiple environments. It is also suggested that future studies consider replication prior to applying results into interventions. Despite these aforementioned limitations, the results from the current investigation will help researchers and clinicians in the SM community to better understand the social competence profile of children with SM and point to other fruitful areas of inquiry with this population, as described in the next section.

**Implications and Future Directions.** Future research is needed to better understand how the results from the current study relates to actual performance in social situations. Observational studies examining how children with SM interact with their peers in a variety of settings, such as in the classroom, on the playground, and at home compared to children without SM and/or other anxiety disorders would be especially informative. Once the relationship between SM and social-emotional competence is better understood, researchers and clinicians will have a more nuanced understanding of the unique needs of children with SM and can plan targeted intervention services.

The current study described and documented social-emotional competence challenges in children with SM, thus, providing a solid foundation for future research to follow-up with more nuanced questions. For example, do children with SM have more social problems compared to children with closely related disorders, such as social anxiety disorder? Do social challenges occur more frequently in children with SM at different age groups? How do social challenges
relate to or predict other variables important to SM, such as a child’s responsiveness to treatment? There are so many questions regarding the nature of SM and few answers exist; further study is necessary in order to understand SM and focus treatment goals.

Contrary to the research hypotheses, results from the correlation analyses indicated no significant relationships between SM symptoms and emotion recognition deficits. One might speculate from these results that social competence problems in children with SM may be less related to mutism per se, but rather a separate feature of the disorder that functions independently of speech. However, it may also be true that the small but nonsignificant correlations observed in the present study (e.g., see Table 10) may prove to be significant in a larger sample, given the limited power to detect small effect sizes in the present study. Further, it is unclear how the psychometric limitations (i.e., internal consistency estimates, homogenous ethnic/language composition) of the primary measure of emotion recognition (i.e., DANVA2) influenced the results, which may be explored by future studies with the use additional emotion recognition measures.

Future studies of SM may also benefit from including broader measures of anxiety symptoms, or including children with various types of anxiety disorders, in order to better understand the nuances between SM and social-emotional competence. For example, with larger samples, it may be possible to compare children with SM only with children diagnosed with other, non-SM, anxiety disorders on measures of social skill ratings and emotion recognition, in order to differentiate features of social functioning that are unique to SM from other anxiety disorders. This is particularly critical for SM due to disagreement in the literature regarding the conceptualization of SM. Despite consensus that SM best understood as an anxiety disorder, some researchers argue that SM should not be classified in the DSM-5 as an independent anxiety
disorder but rather as a subcategory of another anxiety disorder. For example, some consider SM a symptom of social anxiety (Black & Uhde, 1992) or early precursor to social anxiety disorder (e.g., Bergman et al., 2002), while a select few contend it is a type of specific phobia related to the sound of their voice (Omdal & Galloway, 2007). If future studies can identify that children with SM have a unique pattern of processing social information and functioning with their peers compared to and distinct from other anxiety disorders, then researchers and clinicians could be more confident in their conceptualization of SM as a distinct disorder.

Use of a comparison group could help further explore research questions without the limitations of using only clinically normed measures, which are often expensive measures that require training, are not widely available to non-clinical researchers, and do not always have published data related to all types of research questions. For example, the current study did not have a normative comparison group for the research question comparing errors on specific emotion types (e.g., anger versus happy), and thus, it can only be concluded that children with SM make proportionately more errors labelling angry faces compared to happy faces. It remains unclear whether children with SM make more errors labelling angry faces compared to typically developing peers because no published norms exist to answer that specific question. Further, comparison groups could help provide a more nuanced understanding of peer interactions by broadening the types of assessments utilized in the study. Observations with peers offer unique advantages when studying social-emotional competence. For example, Spence et al. (1999) conducted a study that compared the social functioning children with social anxiety disorder to non-affected children in a matched-sample control group using multiple methods, including rating scales, performance tasks, and direct behavioral observations. Results indicated that children with social anxiety disorder (aged 7 to 14) were rated (self- and parent report) as less
socially skilled, and they exhibited social skill and performance deficits compared to children in the comparison group. Observations indicated that children with social phobia interacted less with their peers at school and initiated fewer social interactions than non-anxious peers. Spence et al. (1999) identified children with social phobia have difficulties interacting and engaging effectively with peers and urged the infusion of social skill assessment and training into existing interventions. Future studies may examine the effectiveness of such interventions in children with SM compared to current treatments.

The results of the present study underscore the need to more closely examine the social-emotional competence of children with SM so that interventions can be tailored to target specific challenges. Specifically, children with SM appear to have social skill problems and difficulties with emotion recognition compared to same aged peers. As well, engagement appears to be an important area of difficulty for children with SM. Given these identified challenges, direct instruction and practice in labelling facial emotions and in making new friends should be considered for inclusion in interventions. For example, children could be taught that there are many ways to make and engage with new people, with modelling and practicing appropriate verbal and non-verbal strategies that vary in degree of difficulty. It is clear that children with SM have social-emotional challenges, but they desire to be social and thus, it is the job of researchers and clinicians in the field to continue to conduct research in order to support them appropriately.
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Appendix A

Selective Mutism Questionnaire (SMQ)©

Please consider your child’s behavior in the last two weeks and rate how frequently each statement is true for your child.

AT SCHOOL

1. When appropriate, my child talks to most peers at school.
   Always  Often  Seldom  Never

2. When appropriate, my child talks to selected peers (his/her friends) at school.
   Always  Often  Seldom  Never

3. When my child is asked a question by his/her teacher, s/he answers.
   Always  Often  Seldom  Never

4. When appropriate, my child asks his or her teacher questions.
   Always  Often  Seldom  Never

5. When appropriate, my child speaks to most teachers or staff at school.
   Always  Often  Seldom  Never

6. When appropriate, my child speaks in groups or in front of the class.
   Always  Often  Seldom  Never

HOME/FAMILY

7. When appropriate, my child talks to family members living at home when other people are present.
   Always  Often  Seldom  Never

8. When appropriate, my child talks to family members while in unfamiliar places.
   Always  Often  Seldom  Never

9. When appropriate, my child talks to family members that don't live with him/her (e.g., grandparent, cousin).
   Always  Often  Seldom  Never
10. When appropriate, my child talks on the phone to his/her parents and siblings.
   
<table>
<thead>
<tr>
<th>Always</th>
<th>Often</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
</table>

11. When appropriate, my child speaks with family friends who are well-known to him/her.

<table>
<thead>
<tr>
<th>Always</th>
<th>Often</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
</table>

12. My child speaks to at least one babysitter.

<table>
<thead>
<tr>
<th>Always</th>
<th>Often</th>
<th>Seldom</th>
<th>Never</th>
<th>N/A</th>
</tr>
</thead>
</table>

**IN SOCIAL SITUATIONS (OUTSIDE OF SCHOOL)**

13. When appropriate, my child speaks with other children who s/he doesn't know.

<table>
<thead>
<tr>
<th>Always</th>
<th>Often</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
</table>

14. When appropriate, my child speaks with family friends who s/he doesn't know.

<table>
<thead>
<tr>
<th>Always</th>
<th>Often</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
</table>

15. When appropriate, my child speaks with his or her doctor and/or dentist.

<table>
<thead>
<tr>
<th>Always</th>
<th>Often</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
</table>

16. When appropriate, my child speaks to store clerks and/or waiters.

<table>
<thead>
<tr>
<th>Always</th>
<th>Often</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
</table>

17. When appropriate, my child talks when in clubs, teams, or organized activities outside of school.

<table>
<thead>
<tr>
<th>Always</th>
<th>Often</th>
<th>Seldom</th>
<th>Never</th>
<th>N/A</th>
</tr>
</thead>
</table>

**Interference/Distress**

18. How much does not talking interfere with school for your child?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Extremely</th>
</tr>
</thead>
</table>

19. How much does not talking interfere with family relationships?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Extremely</th>
</tr>
</thead>
</table>

20. How much does not talking interfere in social situations for your child?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Extremely</th>
</tr>
</thead>
</table>

21. Overall, how much does not talking interfere with life for your child?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Extremely</th>
</tr>
</thead>
</table>
22. Overall, how much does not talking bother your child?
   Not at all  Slightly  Moderately  Extremely

23. Overall, how much does your child’s not talking bother you?
   Not at all  Slightly  Moderately  Extremely

Scoring: Always = 5; Often = 2; Seldom = 1; Never = 0

*These items are not included in total score and are for clinical purposes only.
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Appendix B

School Speech Questionnaire*

Name of Teacher Who Completed This Questionnaire:

When responding to the following items, please consider the behavior of your student, ______________, and activities of the past month and rate how often each statement is true.

1. When appropriate, this student talks to most peers at school.
   
   Always   Often   Seldom   Never

2. When appropriate, this student talks to selected peers (his/her friends) at school.
   
   Always   Often   Seldom   Never

3. When called on by his/her teacher, this student answers verbally.
   
   Always   Often   Seldom   Never

4. When appropriate, this student asks you (the teacher) questions.
   
   Always   Often   Seldom   Never

5. When appropriate, this student speaks to most teachers or staff at school.
   
   Always   Often   Seldom   Never

6. When appropriate, this student speaks in groups or in front of the class.
   
   Always   Often   Seldom   Never

7. When appropriate, this student participates nonverbally in class (i.e., points, gestures, writes notes).
   
   Always   Often   Seldom   Never

8. How much does not talking interfere with school for this student?
   
   Not at all   Slightly   Moderately   Extremely

Scoring: Always = 3, Often = 2, Seldom = 1, Never = 0

* These items are not included in total score.
Appendix C

A Histogram of Scaled Scores on the Affect Recognition Test of the NEPSY-II