Parent-child play interaction in Autism Spectrum Disorder: Emotion regulation within the context of a frustrating situation

by

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Ethics Statement

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Abstract

Challenges with emotion regulation are associated with Autism Spectrum Disorder (ASD). Previous research suggests a link between emotion regulation and parenting in children with ASD. The current study examined group differences between children with and without ASD in emotion regulation, as well as parent behaviour associated with child emotion regulation and social-emotional functioning. Twenty-one children with ASD and 20 typically developing (TD) children were asked to complete two interactive tasks with a parent: 1) a frustrating building task (Lego) and 2) a discussion task requiring dyads to generate emotion regulation strategies for the characters in two separate vignettes—one about anger and one about anxiety. Parent and child behaviour were both coded during these tasks. Parents completed questionnaires about their child's social-emotional functioning and children completed a brief cognitive assessment. In the building task, no mean group differences in parent emotion regulation related behaviour were found; however, TD children displayed more positive emotion than children with ASD. Despite no mean group differences, persisting with the problem and cognitive reappraisal of the frustrating building task by parents was helpful in reducing child negative emotion for children with ASD, but not TD children. During the discussion task, specifically during the vignettes about anger, parents of children with ASD were less likely to elaborate about emotions when their child was rated as having more challenges with anger control and social competence, and more likely to elaborate when they rated their child to have fewer challenges with anger control and social competence. During the discussion of the anxiety vignette, more parent scaffolding was associated with better social competence for TD children, but not children with ASD. The results suggest that parents play a role in helping children develop emotion regulation skills; however, the type of parenting behaviour that is helpful differs depending on the emotion and whether the child has ASD.

Keywords: parent-child interaction; emotion regulation; autism spectrum disorder; emotion socialization; social competence

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Introduction

Autism Spectrum Disorder (ASD) is classified as a neurodevelopmental disorder characterized by deficits in social communication and social interaction, and restricted and/or repetitive behaviours and interests (American Psychiatric Association, 2013). Children diagnosed with ASD have difficulty responding to social cues and displaying reciprocity in social interactions. Recent estimates suggest that 1 in 66 children age five to 17 have a diagnosis of ASD in Canada (National ASD Surveillance System, 2018). ASD is diagnosed in boys more than girls at a rate of approximately 4:1 (American Psychiatric Association, 2013). Estimates of co-occurring intellectual disability in ASD are around 31%, while 46% of children with ASD in the United States have at least an average IQ (Christensen, 2016). Up to 70% of children with ASD may have comorbid mental health diagnoses or behavioural concerns such as anxiety, depression, attention concerns, and hyperactivity (Simonoff et al., 2008). In addition, individuals with ASD are often described to be at a higher risk for anxiety disorders than the typically developing population (MacNeil, Lopes, & Minnes, 2009; Strang et al., 2012; White, Schry, & Maddox, 2012).

Poor emotion regulation has been put forth as a hypothesis to explain high rates of mental health diagnoses co-occurring with ASD (Mazefsky et al., 2013; Mazefsky, Pelphrey, & Dahl, 2012). Studies specifically examining the association between ASD symptom severity and emotion regulation found that children with ASD displayed poorer emotion regulation when compared to their typically developing (TD) peers, and their emotion regulation was related to ASD symptom severity (Goldsmith & Kelley, 2018; Samson et al., 2014). Samson and colleagues (2014) also examined intellectual (IQ) and adaptive functioning in addition to ASD symptom severity and found significant correlations between emotion regulation and symptom severity only.

Parent behaviour is also associated with emotion regulation in the child with ASD (Gulsrud, Jahromi, & Kasari, 2010; Hirschler-Guttenberg, Feldman, Ostfeld-Etzion, Laor, & Golan, 2015). Few studies have examined the relationship among parenting, ASD, and emotion regulation, and fewer have examined this relationship within the middle childhood age group (e.g., Ting & Weiss, 2017; Fenning et al., 2018). In a study by Fenning and colleagues (2018) more parent scaffolding during co-regulation tasks was

associated with less emotion dysregulation in children age four to 11 with ASD (IQ > 40; Fenning, Baker, & Moffitt, 2018). Although middle childhood is a time when children are spending more time away from their parents (e.g., more playdates, recreational activities, lessons), parents continue to be important for children with ASD more so than children without ASD because parents often take a larger role in structuring social activities and involvement in the child's interventions (Karst & Van Hecke, 2012) .

Emotion Regulation, Social Competence, & Context

Emotion regulation is defined for the current purposes as a relational or interpersonal process that is context dependent (Campos, Walle, Dahl, & Main, 2011; Kiel & Kalomiris, 2015; Rose-Krasnor, 1997). Contexts include being with other people, but also include different cultures, or different social interactions with the same people (Campos et al., 2011; Cole et al., 2004). What may be a helpful emotion regulation strategy in one context may not be a helpful strategy in another context (Thompson et al., 2013). Children must navigate different systems (such as family, culture, schooling, etc.) and this may result in a child learning to regulate their emotions differently in different situations (Thompson, 2011). There may be bi-directional or multi-directional relations between intrapersonal factors within the child (e.g., temperament) and those external to the child, such as parenting (Eyberg, Schuhmann, & Rey, 1998; Sameroff, 2009). For example, emotion socialization (parenting of emotion) is associated with child emotion and behavior (Dunsmore et al., 2013; Eisenberg et al., 1998).

In addition to being a relational process, emotion regulation is also considered a dimension of social competence (Yager & Iarocci, 2013). Social competence is defined as "the active and skillful coordination of multiple processes and resources available to the [individual] to meet social demands and achieve social goals in a particular type of social interaction and within a specific context" (Iarocci, Yager, & Elfers, 2007, p. 113). Rose-Krasnor's (1997) prism model of social competence also defines emotion regulation as a part of social competence. This model includes three levels: a theoretical level (effectiveness; transactional, context-dependent, performance, influenced by goals, p. 120), an index level (both self and other domains of social competence; maintaining friendships, autonomy, p. 122), and a skill level (behaviour, regulation, motivation, goals, p. 123). Emotion regulation is included as an aspect of social competence at the skill

level, which according to the prism model means that emotion regulation is associated with the larger social context.

Many researchers acknowledge contextual contributions to a child's emotion regulation. Emotion regulation is often defined as the modulation of emotions through various processes that may be internal or external to a person (Cole, Martin, & Dennis, 2004; Eisenberg, Cumberland, & Spinrad, 1998; Thompson, Virmani, Waters, Raikes, & Meyer, 2013). Thompson (1994) provides the following definition: "Emotion regulation consists of the extrinsic [e.g., parenting, culture, environment] and intrinsic processes [e.g., temperament, diagnosis, physiological arousal, coping strategies] responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (p. 27-28). Some processes that contribute to emotion regulation include situation selection (e.g., avoiding stressful situations), situation modification (e.g., a parent joining their child in an anxiety provoking situation to make things easier), attentional deployment (e.g., focusing on other things during a stressful situation), cognitive change (e.g., cognitive restructuring or reframing of anxiety, "It's a small insect, I am larger than it"), and response modulation (e.g., managing the expression of emotions—a child smiling after receiving a disappointing gift; (Gross, 1998; Gross & Thompson, 2007). These processes of emotion regulation may be initiated by the child or their social partner, underscoring the importance of the social and contextual factors that may be associated with emotion regulation (Eisenberg & Spinrad, 2004).

Emotion socialization: The parenting of emotions and emotion regulation

Parenting of child emotions and regulation is considered an important contributor to many aspects of child development including theory of mind and emotional understanding (Denham & Kochanoff, 2002; Laible, 2004; Symons, Fossum, & Collins, 2006), peer relationships (Katz, Hunter, & Klowden, 2008; Katz & Windecker-Nelson, 2004), and aggression, depression/anxiety, and withdrawing behaviour (Katz & Hunter, 2007; Katz & Windecker-Nelson, 2006). There are different aspects of emotion socialization that are considered important for emotion regulation, specifically.

Morris and colleagues (2007) presented the Tripartite Model of the Impact of the Family on Children's Emotion Regulation and Adjustment (Tripartite Model) which focused on the relationship between family socialization factors and one aspect of social competence—emotion regulation. This model defines three broad family characteristics including observation (e.g., what the child observes their parent doing; modeling emotion regulation for a child), parenting practices specific to emotion (e.g., reacting to and coaching emotions), and the emotional climate of the family (e.g., attachment, expressiveness). Morris et al (2007) hypothesized that the above family characteristics influence child emotion regulation, which in turn influences child adjustment. The Tripartite Model also includes bidirectional and reciprocal relationships between the family variables and parent and child characteristics such as age, temperament, and developmental level.

Although most early research focused on emotion socialization in children preschool-aged and younger (Eisenberg et al., 1998; Lunkenheimer et al., 2007) several parenting characteristics related to the Tripartite Model (Morris et al., 2011, 2007) are associated with child emotion regulation in middle childhood including parents' own emotion regulation (Bariola, Hughes, & Gullone, 2012; Morelen, Shaffer, & Suveg, 2014), emotion coaching and dismissing (e.g., supporting a child through their emotions and teaching them about emotions versus dismissing or "downplaying" emotional responses; Lunkenheimer, Hollenstein, Wang, & Shields, 2012; Lunkenheimer, Shields, & Cortina, 2007), supportive responses to negative affect (Lougheed, Hollenstein, Lichtwarck-Aschoff, & Granic, 2015), and other broad parenting behaviours such as warmth (Colman, Hardy, Albert, Raffaelli, & Crockett, 2006; McDowell et al., 2002), and attachment security (Brumariu, Kerns, & Seibert, 2012; Contreras, Kerns, Weimer, Gentzler, & Tomich, 2000; Kerns, Abraham, Schlegelmilch, & Morgan, 2007). The research suggests that parents continue to play an important role in their child's emotion regulation throughout middle childhood despite increased opportunities to be away from the parent (e.g., more time with friends, sports programs, lessons).

Methods used to examine parent-child interaction in middle childhood

The way in which observational data is used to study emotion regulation and parent-child interactions in this age group varies. Some studies use only self-report (e.g., Kerns

et al., 2007). Others combine self or parent report with observational methods. For example, McDowell and colleagues (2002), studied parenting behaviour within a parent-child interaction (discussion task), but examined behaviour in relation to a child-report measure of child emotion regulation. Other researchers examine both parent and child behaviour (age 7 to 12) within the same interaction, as well as how the behaviours within the same interaction are related to or contingent on one another. These are generally parent-child discussion tasks similar to that used by McDowell et al (2002) where the parent-child dyad/triad/family discusses past events when the child was displaying a specific emotion (e.g., happy, sad, angry, excited; Morelen & Suveg, 2012), or discusses a time of parent-child or family conflict (e.g. Lougheed et al., 2015; Lunkenheimer et al., 2012, 2007; Morelen et al., 2014). These conversations are then coded for a variety of parent and child behaviours including affect, sensitivity, responsiveness, warmth, teaching about emotions, intensity of negative affect, and emotion regulation strategies generated and used during the task (Lougheed et al., 2015; Morelen et al., 2014; Morelen & Suveg, 2012).

Researchers then examine sequential, reciprocal, or contingent behaviours and how these micro-level behaviours might contribute to or be related to broader social-emotional functioning (Lunkenheimer et al., 2007; Morris et al., 2011). For example, when parents provided unsupportive responses to their child's adaptive emotion regulation strategies that were generated during emotion discussion tasks, it was related to child psychopathology in children age seven to 12 (Morelen & Suveg, 2012). Studies using these methods also provide support for the notion that parent socialization of emotions in response to child emotion at the micro level (e.g., within specific discussion exchanges between parent and child) has implications for broader child outcomes, as well as future behaviour during the interaction (Lunkenheimer et al., 2007; Morelen & Suveg, 2012; Thomassin & Suveg, 2014). When discussion tasks are used, however, parents and children are removed from the negative emotion provoking events that they are discussing, and this may change or mask how parent and child behaviour influence one another in an emotionally charged situation.

Emotion Regulation in Autism Spectrum Disorder

Emotion regulation in children with ASD has often been studied within the context of interventions. When emotion regulation was specifically targeted, children with ASD

showed improvement after a treatment intervention study (Scarpa & Reyes, 2011; Thomson, Riosa, & Weiss, 2015). Emotion regulation also improved as a secondary outcome of other interventions (Beaumont, Rotolone, & Sofronoff, 2015; Beaumont & Sofronoff, 2008; Gulsrud et al., 2010; Masi, Cosenza, Mucci, & Brovedani, 2001; Sofronoff, Attwood, Hinton, & Levin, 2007), and after being taught cognitive restructuring skills to complete a vignette task (Samson, Hardan, Podell, Phillips, & Gross, 2015). These findings suggest that although individuals with ASD tend to report struggles with emotion regulation, improvements are possible.

Research on group differences between ASD and typically developing (TD) samples

Observational laboratory studies show that young children with ASD differ in their emotion regulation strategies during emotion eliciting tasks when compared to their TD peers. Preschool children with ASD may use more self-regulatory strategies more frequently, as well as more venting, avoidance, and resignation when compared to their mental age and language matched TD peers during frustrating situations (Hirschler-Guttenberg, Feldman, et al., 2015; Jahromi, Meek, Ober-Reynolds, & Ober-Reynolds, 2012). Group differences in total amount of emotion regulation strategies were also found between children diagnosed with ASD and a typically developing comparison group (Konstantareas & Stewart, 2006), however, the findings are difficult to interpret due to methodological limitations such as a large age (age 3-10) and IQ (only reported for ASD group) range, small sample size (ASD n=19), and unmatched comparison group (n = 23).

Studies using parent-report found that parents of children with ASD rated their children to be more emotionally dysregulated or to have more overall emotion related concerns compared to TD children matched on age in the preschool to early adulthood age groups (Jahromi, Bryce, & Swanson, 2013; Rieffe et al., 2011; Samson, Wells, Phillips, Hardan, & Gross, 2015). Studies utilizing self-report found both group differences and similarities related to emotions (Rieffe et al., 2011; Samson, Harden, et al., 2015). When compared to their age-matched TD peers, high functioning school-aged children and adolescents with ASD (e.g., IQ < 70) reported less adaptive emotion coping strategies (e.g. problem solving, reappraisal; Rieffe et al., 2011; Samson, Hardan, et al., 2015). Other studies found no difference in adaptive emotion strategy use between children and adolescents

with ASD and their age matched TD peers, but found that individuals with ASD reported more strategies typically described as maladaptive (e.g., more dysregulation, denial of emotions, freezing, and avoidance; Mazefsky, Borue, Day, & Minshew, 2014; Pouw et al., 2013; Rieffe, Camodeca, Pouw, Lange, & Stockmann, 2012). Overall, there is evidence for group differences and similarities in emotion regulation across methods.

Emotion regulation strategies reported by individuals or their parents were differentially associated with mental health and social outcomes when children with ASD were compared to TD children (Mazefsky et al., 2014; Pouw, Rieffe, Stockmann, et al., 2013; Rieffe et al., 2011; Rieffe et al., 2012; Samson, Wells, et al., 2015). More adaptive coping strategies were associated with less somatic complaints and worry/rumination in a sample of 9 to 12-year-old children with ASD (Rieffe et al., 2011). This pattern of results was different from their chronological age-matched TD comparison group where more adaptive coping strategies were associated with less depressive symptoms, but not less worry or somatization (Rieffe et al., 2011). Longitudinal research also suggests that negative emotionality, emotional awareness, and worry/rumination may predict internalizing and externalizing behaviour 18 months later in boys aged nine to 15 with ASD (Bos, Diamontopoulou, Stockmann, Begeer, & Rieffe, 2018). Because the evidence suggests that different emotion regulation strategies are associated with different mental health related outcomes for children with ASD compared to children without ASD, further research on helpful emotion regulation strategies is needed to inform intervention.

Many methods have been used to assess emotional regulation in children with ASD (Weiss et al., 2014) including self-report mood checklists, self-report coping scales (Pouw, Rieffe, Oosterveld, Huskens, & Stockmann, 2013; Pouw, Rieffe, Stockmann, et al., 2013; Rieffe et al., 2011; Rieffe et al., 2012), parent report (Jahromi et al., 2013), and responses to vignettes about what the main character should do (e.g., Beaumont & Sofronoff, 2008; Thomson et al., 2015). It is important to consider that children with ASD may be able to verbally communicate how they could deal with negative emotions, even though they may not be able to follow through on those strategies during moments of distress (Khor, Melvin, Reid, & Gray, 2014) and that discrepancies between direct observation and third-party or self-reports may be more evident in children with ASD compared to TD children (Gomez-Perez, Mata, & Colero, 2018). Thus, multi-method

studies of emotion regulation that include both parent report and observational measure are preferable.

Socialization of Emotions in Autism Spectrum Disorder

The role of parents in the emotional functioning of children with ASD has focused on orientation to emotion coaching or dismissing (King, 2013; B. J. Wilson, Berg, Zurawski, & King, 2013), emotion co-regulation and facilitation (e.g., parent behaviour in response to child emotion; Fenning et al., 2018; Gulsrud et al., 2010; Hirschler-Guttenberg, Golan, Ostfeld-Etzion, & Feldman, 2015; Hirschler-Guttenberg, Golan, Ostfeld-Etzion, & Feldman, 2015; Ting & Weiss, 2017), and parent self-reported reactions to child emotion (Bougher-Muckian, Root, Coogle, & Floyd, 2015). With the exception of the work of Ting and Weiss (2017) and Fenning et al. (2018), this research has been conducted on children under the age of six.

In a study conducted by Wilson and colleagues, parents of children with ASD who described themselves to be emotion coaches (e.g., discussing and talking their children through their negative emotions rather than dismissing or minimizing negative emotions in their child), were less likely to describe their preschool children as demonstrating emotionally-driven externalizing behavior (Wilson et al., 2013). Parent emotion coaching moderated the relationship between group status (ASD vs. TD) and emotionally driven externalizing behaviours. The results of this study suggest that the way in which parents of children with ASD think about emotion coaching is associated with their thoughts about their child's ability to regulate their emotions (both were assessed through parent report).

Bougher-Muckian and colleagues (2015) found that parents of preschool children with ASD rated themselves to be more supportive of their child's anger and fear (presented in vignettes) when compared to parents of chronological age-matched TD children (Bougher-Muckian et al., 2015). Parents of children with ASD may be more supportive of their children's negative emotions due to the belief that the negative emotions are related to their child's disorder, rather than the child themselves (Bougher-Muckian et al., 2015).

In an observational research study, researchers found that when preschool children with ASD age three to six and their parents were compared to mental age-matched comparison dyads, parents did not differ in frequency of emotion regulation facilitation (Hirschler-Guttenberg, Feldman, et al., 2015). A similar study by the same research group (Hirschler-Guttenberg, Golan, et al., 2015) found that parents of children with ASD were also found to use simpler strategies with their preschool children age three to six compared to parents of mental-age matched comparison groups (e.g., behavioural/physical strategies rather than cognitive or emotion focused strategies; Hirschler-Guttenberg, Golan, et al., 2015). This research group also found no difference in parental characteristics of warmth and sensitivity between groups (Hirschler-Guttenberg, Golan, et al., 2015). Although no group differences were found for these parenting variables, higher authoritarian style (e.g., exhibiting both high control and low responsiveness in parenting) in the ASD group, however, predicted fewer child attempts to co-regulate their anger with their parent, and more attempts to self-regulate (Hirschler-Guttenberg, Feldman, et al., 2015). Higher authoritative parenting (e.g., exhibiting high control and high responsiveness in parenting) in the ASD group predicted more child fear self-regulation (Hirschler-Guttenberg, Feldman, et al., 2015). These associations were not found in the TD group. The findings of this study suggest that although parents may be similar in the mean amount and quality of their parenting, there are certain aspects of parenting behaviour that appear to be related to emotion regulation for children with ASD, but not for children without ASD. Whether this pattern of results holds true for older children has yet to be investigated.

Two studies which included older children with ASD did not include typically developing controls. Within an eight to 12 year-old sample of children with ASD (average IQ), child emotion regulation strategy generation during a (child only) vignette task and parent scaffolding during a parent-child emotion discussion task were associated with parent-reported child externalizing problems (Ting & Weiss, 2017). Child emotion regulation and parent scaffolding were not, however, correlated with one another (Ting & Weiss, 2017). Fenning and colleagues (2018) found that child dysregulation during a dyadic task was associated with autism symptom severity, lower quality scaffolding, and age in four to 11 year-old children with ASD (IQ > 40). They also found that children demonstrated more dysregulation in an independent task when compared to a parent-child task, suggesting that children with ASD have difficulties generalizing the support parents provide when

working independently (Fenning et al., 2018). These studies examined parent scaffolding through global coding methods, where an overall scaffolding score in three areas was assigned to each parent during the dyadic task. No studies with school-aged children to date have examined specific instances of parent behaviour in response to in-the-moment child emotion and behaviour and used a comparison group of children without ASD.

Slaughter and colleagues (2007) examined emotion socialization through parent mental state talk and found that frequency of mental state language did not differ between parents of children age four to nine with ASD and verbal age-matched typically developing children (Slaughter, Peterson, & Mackintosh, 2007). Parent elaborations of mental states, however, were associated with social understanding (theory of mind) for children with ASD, and not their verbal age-matched peers (Slaughter et al., 2007). When helping their children to regulate emotions, parents of children with ASD often speak and behave very similarly to parents of children without ASD; however their emotion socialization related behaviour appears to have many more associations with their child's social and emotional understanding when compared to parents of children without ASD.

Overall, the research suggests that children with ASD use more maladaptive emotion regulation strategies compared to children without ASD. Even when there are no group differences found in child emotion regulation, associations between emotion regulation variables and other variables (e.g., mental health) are different between the groups. The research about parenting is mixed and findings are less clear. A variety of methods including parent interview, parent self-report, and observations of parent-child interactions have been used. Most studies examined children under the age of six. There is some evidence that parenting behaviour is more strongly associated with child emotion regulation in parents of children with ASD compared to parents of children without ASD. In studies examining older children with ASD, however, no TD comparison groups have been used so further research is needed to evaluate patterns of association between parent emotion socialization and child emotion regulation.

The Current Study

The current study extends previous research by: 1) including an understudied population (parent-child dyads with ASD; children age 7 to 12); 2) using methods that capture in-the-moment reactions of both members of the dyad; 3) examining associations between in-the moment behaviour and child characteristics and; 4) including a TD comparison group. In addition, I examined the socialization of emotion during a discussion task and examined how parenting in one context (e.g., discussing someone else's emotions) might also be associated with behaviour in another context (e.g., when the child is frustrated during another task). Parents and children participated in two interactive tasks where they were asked to create Lego figures and discuss emotions and emotion regulation strategies from two vignettes provided to them. These interactions were coded. Operational definitions are described in subsequent sections. The current study aimed to answer the following research questions:

Description of Group Differences and Similarities

Research Question 1: How do parents of school-aged children with ASD interact with their children in a frustrating situation, and do they interact differently than parents of typically developing children?

I aimed to describe how parents of children with ASD and without (age 7-12) helped to regulate their child's emotion. I predicted that:

a. Parents would differ in their level of problem solving, overall support (emotional support, praise), and cognitive reappraisal. Specifically, I predicted that on average parents of children with ASD would provide more support and engage in more problem solving compared to parents of children without ASD.

b. On average parents of children with ASD would engage in less cognitive restructuring compared to children without ASD.

Research Question 2: How do children with ASD respond to frustrating situations when with their parents , and is this different than responses of typically developing children?

I predicted that:

a. In response to the frustrating situation, children with ASD would have more intense negative affect on average compared to their TD peers during interactions.

b. Children with ASD would use more traditionally maladaptive coping strategies on average (i.e. more venting, less cognitive reappraisal compared to their TD peers, based on previous research; Jahromi et al., 2012; Samson, Wells, et al., 2015).

c. Children without ASD would use more problem-solving strategies on average compared to children with ASD.

Parent-child Interaction Question

Research Question 3: In families with children with ASD, which parenting behaviours are helping to co-regulate child emotions during a frustrating situation, and is this different than for TD children?

I predicted that:

a. For children without ASD, emotional support, praise/encouragement, and cognitive reappraisal would be associated with a decrease in negative emotion on average.

b. The patterns found would be disrupted for children with ASD—that the same parent behaviours helpful for TD children, would not be helpful for children with ASD.

c. Parent problem solving behaviour in both groups would be associated with a decrease in child negative emotion in both groups.

Associations with Child Outcomes

Research Question 4: Is parent behaviour during the discussion task associated with their perceptions of their child's anxiety and anger?

I predicted that:

a. Parents who rated their children to have less anxiety and less anger would be observed using more helpful parenting behaviour (scaffolding and elaboration).

b. There would be stronger associations between the parenting and child anxiety/anger for the group with children with ASD.

Research Question 5: Is how parents elaborate on emotions associated with child emotion regulation (through behaviour observed in Lego task), and is this different than what is found in TD children?

I predicted that:

a. More emotion elaboration during a vignette discussion task would be associated with less overall child negative affect during the Lego task.

b. This association would be stronger for children with ASD compared to TD children.

Research Question 6: Does the number of strategies a dyad generates during the vignette task correlate with how successful parent and child are in decreasing child distress during the Lego task, and does this differ between groups?

Vignette tasks are often used to assess child emotion regulation before and after treatment, but it is possible that strategy generation does not correlate with observable behaviour. I had no specific hypothesis for this research question. Effect sizes are presented to assess whether associations between the two methods are present.

Research Question 7: Is parent elaboration and scaffolding during the vignette task associated with child social competence, and is this different between groups?

I predicted that:

a. More elaboration and scaffolding of emotion during a vignette discussion task would be related to better social competence scores on average as rated by the MSCS (higher score).

b. The correlation between emotion elaborations and child social competence would be stronger for the ASD group compared to the TD group.

Method

Procedure

The current study was approved by Simon Fraser University's Ethics Review Board. Families were invited to contact the Autism and Developmental Disorders Laboratory if they were interested in the research study. Interested families were contacted by phone to provide more details about the study. Parents completed consent forms (Appendix A) and questionnaires online and brought their child to a lab appointment, where their child provided assent (Appendix B). In the lab, the parent-child dyad completed two interaction tasks together, children completed an assessment of intellectual functioning, and parents completed paper copies of some questionnaires. The assessment of intellectual functioning always occurred between the two interaction tasks, which were counterbalanced across participants. Compensation was provided at a rate of $10 per hour and children received a prize for their participation. A de-briefing form was provided (Appendix C).

Participants

Twenty children without ASD and 20 children with ASD were initially recruited for this study. Data from one child per family was included in the current study to preserve the independence of data; however, siblings were also welcomed to participate for a prize. This minimized the number of questionnaires and time commitment required of the participating families. For one participant, the manipulation failed (stuck together Lego pieces broke apart) and they were eliminated from analyses involving that task. One additional participant with ASD was then recruited resulting in 41 total participants (21 ASD, 20 TD). Participants were recruited mostly through the Autism and Developmental Disorders Laboratory email list. Other recruitment occurred through advertising in local public elementary school newsletters, community groups, bulletin boards, and word of mouth.

In the jurisdiction in which these data were collected, in order to qualify for funding from the Ministry of Children and Family Development Autism Funding Program children must be assessed by a pediatrician, psychologist, or psychiatrist trained to administer the ADI-

R and ADOS-2 (Autism Diagnostic Interview-Revised, ADI-R, Rutter, Couteur, & Lord, , 2013; Autism Diagnostic Observation Schedule-2nd edition, Lord, DiLavore, & Gotham, 2012). As well, each child must fulfill the DSM criteria for ASD (American Psychiatric Association, 2013). Diagnostic reports were obtained for each child in the ASD sample for the purpose of confirming their ASD diagnosis. Parent ratings of child ASD related behaviour on the Social Responsiveness Scale-2 further confirmed that the two groups differed on mean ASD-related symptoms (SRS-2 total score; $t = -8.29$, $p < .001$).

Child participants ranged in age from seven to 12 at the time of the laboratory appointment and had a mean age of 10 (SD = 1.67). There were no mean group differences in age ($U = 228.00$, $p = .64$) or Intelligence Quotient (IQ; $t = 1.66$, $p = .11$; $g = .52$). When full scale IQ scores were deemed uninterpretable (i.e., a greater than 1.5 standard deviation difference between verbal and perceptual reasoning), the best estimate (i.e., larger) of the participant's IQ was used in the analyses. For one participant, only the Perceptual Reasoning score was used due to behavioural challenges during the administration of the verbal subtests. For another participant, an older IQ estimate using the two-scale Wechsler Abbreviated Scale of Intelligence IQ (WASI-II) was substituted due to behaviour problems during the cognitive assessment. The total sample included 14 female children (34.15%); four female children were included in the ASD group (19.05%). Children in the sample were ethnically diverse. Child participants of European descent accounted for only 43.90% of the total sample.

With regard to mental health related symptoms, the mean levels of BASC-2 Externalizing and Internalizing scores fell within the normal range (Behaviour Assessment System for Children-2; $t = 55$, for both). For the remainder of the analyses, a p-value of less than .1 was considered significant, to account for low power (small sample size). Groups did not differ on mean ratings of externalizing behavior ($t = -.88$; $p = .38$, $g = .28$). Parents of children with ASD rated their children approximately eight points higher on average for internalizing behaviour ($t = -1.83$; $p = .08$, Welch-Saitterwaite correction; $g = .57$). When examining anxiety specifically, the mean rating for the full group on the Spence Child Anxiety Scale-parent version (SCAS-P) was 57 (average range). Children with ASD were rated higher compared to children without ASD on anxiety ($t = -1.94$, $p = .06$, $g = .60$). For social competence, children without ASD scored higher on average for both the Multidimensional Social Competence Scale (MSCS) total score ($t = 8.12$; $p < .01$; $g = 2.54$) and emotion regulation subscale than

children with ASD (t = 3.84; p < .01; g = 1.20). Please see Table 1 for more information on the above child variables.

In the group of children without ASD, one child had a diagnosis of learning disability. In the group of children with ASD, one child had a co-occurring diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD), one child had anxiety, two children had a diagnosis of a learning disability, one child had congenital hearing loss, whose hearing had been corrected for more than two years (and also had average intelligence and verbal intelligence), and one child had an "other" diagnosis for which more details were not reported.

Table 1: Child characteristics

	Total (n=41)	ASD (n=21)	TD (n=20)	p-value
Mean Age (SD)	10.14 (1.67)	10.22 (1.77)	10.05 (1.59)	.64
Ethnicity				
White	18	9	9	
East Asian	8	5	3	.44
South Asian	5	1	4	
Mixed	10	6	4	
Mean IQ (SD)	108.07 (12.25)	105.05 (13.25)	111.25 (10.52)	.11
Mean SRS-2 (SD)	61.68 (14.27)	72.62 (10.65)	50.20 (6.178)	<.01
MSCS Total Score	248.49 (9.02)	205.05 (31.43)	294.10 (38.59)	<.01
MSCS ER Score	32.98 (56.85)	28.43 (6.73)	37.75 (8.76)	<.01
BASC-Ext	55.32 (10.37)	56.71 (7.69)	53.85(12.64)	.38
BASC-Int	55.41 (13.85)	59.14 (15.80)	51.50 (10.47)	.08
SCAS-P	56.90 (7.52)	58.52 (7.40)	53.95 (7.72)	.06

Note. A Mann Whitney U test was used to examine group differences in age. A Pearson Chi-square test was used to examine group differences in ethnicity. A t-test was used for all other mean group differences

Parents in the sample were mostly mothers; one father and one grandmother who reported they were primary caregivers also participated. Participating parents were, on average, 43 years old (range: 31-56). The majority of the parents were married (80.49%), and 70% of the families' annual income was greater than $80,000 a year. Participating caregivers completed information about themselves and their child's other parent. Approximately 80% of mothers (and grandmother) completed education beyond high school (68% of fathers). Parents of children with and without ASD were not significantly different in their levels of education; however, there was a group difference in income. Families of children without ASD reported at least $50, 000 in annual income while more families of children with ASD reported income in the two highest income brackets (> 110, 000) and in the lowest ($20-49, 000). The Kruskal-Wallis test was used

to examine whether mean group differences in dependent variables of interest were present based on income group. The following variables were identified: child support seeking during the Lego task (Test Statistic = 11.22; p =.02) and child strategy generation during the anxiety discussion task (Test Statistic = 10.51; p = .03). Family income was included in the two regression equations when examining these variables to determine whether an association between income and these variables continued to exist after accounting for other variables in the regression equations. Please see Table 2 for a full summary of parent and family characteristics.

Table 2: Parent and family characteristics

	Total (n=41)	ASD (n=21)	No-ASD (n=20)	p-value
Mean Age (SD)	43.65 (5.11)	44.50 (6.27)	42.79 (3.60)	.33
Maternal Education				.78
High School	6	3	3	
Professional Diploma	7	3	4	
University Degree	17	10	7	
Graduate Degree	9	4	5	
Other	1	0	1	
Paternal Education				.61
High School	8	5	3	
Professional Diploma	10	6	4	
University Degree	13	7	6	
Graduate Degree	5	1	4	
Other	2	1	1	
Family Income ($)				.01
20-49, 000	2	2	0	
50-79, 999	8	2	6	
80-109, 999	8	1	7	
110-140, 000	8	7	1	
>140, 000	13	8	5	

Note. Pearson Chi-square tests were used to examine education and income. A t-test was used to examine age.

Measures

WASI-II. The Wechsler Abbreviated Scale of Intelligence- Second Edition (Wechsler, 2011) provides an overall IQ score to estimate cognitive functioning in children and adults aged 6 to 90. The full scale IQ score is created from two subdomains of cognition including the Verbal Comprehension Index (assessing word knowledge and verbal abstract reasoning) and the Perceptual Reasoning Index (assessing fluid and visual processing using pictures and blocks to create and finish patterns). The four subtests in these two subdomains provided an estimate of child cognitive ability in the current study.

The WASI-II scores are reported in it's manual to have good internal consistency (split-half reliability >/= .83), test-retest reliability (r >/= .79), and inter-scorer agreement (ICC >/= .94) in children (Wechsler, 2011). Additionally, the WASI-II total IQ scores are highly correlated with long form Wechsler Intelligence tests (e.g., WAIS-IV, WISC-IV) in individuals with and without ASD (Minshew et al., 2005), as well as abbreviated batteries from other publishers (e.g., KBIT-2; Wechsler, 2011).

SRS-2. The Social Responsiveness Scale-2 (SRS-2; Constantino & Gruber, 2012) is a parent-report questionnaire of child ASD symptom severity. The SRS-2 total score was used to describe the symptom severity of the ASD group, as well as to ensure that the ASD and TD groups in the current study differed on their severity of core ASD symptoms. Parents rate their children on a four-point scale (not true to almost always true) based on a series of statements related to symptoms of ASD. The SRS-2 contains items that map on to DSM-5 criteria for ASD: restricted interests and repetitive behaviour (e.g., "Has an unusually narrow range of interests"), and social communication and interaction deficits. Social communication and interaction deficits are further broken down into four subscales: social awareness (e.g., "seems to react to people as if they are objects"), social cognition (e.g., "doesn't recognize when others are trying to take advantage of him or her"), social communication (e.g., "avoids eye contact or has unusual eye contact"), and social motivation (e.g., "would rather be alone than with others"). The SRS-2 manual reports that scores demonstrate good internal consistency (alpha >/= .95). Validity of the SRS-2 is evidenced by modest correlations with other questionnaires, semi-structured interviews, and ASD symptoms assessment methods (Constantino & Gruber, 2012). In the current sample, Cronbach's alpha equaled to .97 for the full sample. It was calculated to be .95 and .87 in the ASD and TD groups, respectively.

BASC-2. The Behavioural Assessment System for Children-Second Edition (Reynolds & Kamphaus, 2004) is a broadband parent-report questionnaire of their child's overall psychosocial functioning (internalizing and externalizing behaviour, school problems, adaptive functioning). The scales of interest in the current study include the internalizing and externalizing clinical scales. Internalizing scale items include those related to anxiety, depression, and somatization (e.g., "is sad" and "worries"). Externalizing scale items include those related to hyperactivity, aggression, and conduct problems (e.g., "bullies others" and "is easily distracted"). The BASC-2 has been standardized on a large

sample including participants from a broad age range (preschool to college).The BASC-2 manual reports that internalizing and externalizing scores demonstrate good internal consistency (alpha > .89), and test-retest reliability (r >/= .78). The validity of the BASC-2 items has been generally supported through moderate correlations between other parent-report measures of behaviour (Reynolds & Kamphaus, 2004). There is one form for children age 6-11 (child version) and one for children over 12 (adolescent version). In the current study, internal consistency of the scores from the child version internalizing scale was calculated to be .92 for the full sample (Cronbach's alpha). Cronbach's alpha was calculated to be .91 and .93 for the TD and ASD groups, respectively. Internal consistency for the externalizing scale was calculated to be .93 for the full sample. Cronbach's alpha was .95 (TD) and .90 (ASD) for the scores of each group. As only 6 participants used the adolescent version of the BASC-2, Cronbach's alpha is not reported as the values are likely not stable estimates.

MSCS. The Multidimensional Social Competence Scale (MSCS parent version; Yager & Iarocci, 2013) is a parent-report questionnaire designed to assess several dimensions of child social competence including social motivation (e.g., "avoids talking to people when possible"), social inferencing (e.g., "is naïve"), demonstrating empathic concern (e.g., "seems concerned about people and their problems"), social knowledge (e.g., "follows social "rules" around privacy"), verbal conversation skills (e.g., "gives other people a chance to speak during conversations"), nonverbal sending skills (e.g., "facial expressions seem 'flat'), and emotion regulation (e.g., "his/her emotional responses tend to be extreme"). Items within each scale have good internal consistency (alpha >/= .84; Yager & Iarocci, 2013). In the current study, Cronbach's alpha equaled .98 for the MSCS total score in the full group. For the ASD group it equaled .93, and it was .97 for the typically developing (TD) group. The Emotion Regulation Cronbach's alphas were calculated to be .91, .76, and .93 for the full group, ASD group and TD group, respectively.

SCAS-P. The Spence Child Anxiety Scale-Parent Version (SCAS-P; Nauta et al., 2004) is a parent-report questionnaire of child anxiety in several domains including a total score, social phobia, panic/agoraphobia, generalized anxiety, separation anxiety, obsessive-compulsive disorder, and physical injury fears. The total score was used in the current study. Example items include "my child worries about things," "my child worries that something bad will happen to him/her," and "my child complains of his/her

heart starting to beat too quickly for no reason." The items on the SCAS-P have adequate internal consistency (Cronbach's alpha .58- .81; Nauta et al., 2004). In the current study, the internal consistency of the items in the SCAS-P total score fell into the good to excellent range (Cronbach's alpha = .90 full group; alpha = .90 TD group; alpha = .89 ASD group).

Family demographics questionnaire. The demographics form developed by the Autism and Developmental Disorders Laboratory includes questions about the child's age/birthdate, gender, contact information, cultural background, second language exposure, family members, family income, parent education, child friendships, time spent weekly in intervention, type of schooling, and diagnostic information. Each parent completed this form about their family (Appendix D).

Parent-child emotion discussion task. Parents and their children were asked to read and talk about two short vignettes. One vignette was about a child experiencing anxiety and one was about a child experiencing anger (James and the Math Test and Dylan is being Teased; (Attwood, 2004b, 2004a). These two vignettes have been used in previous studies to examine the efficacy of cognitive behavioural interventions for children with ASD who are experiencing anxiety, without the inclusion of their parent in the task (Beaumont & Sofronoff, 2008; Ting & Weiss, 2017). Dyads were asked to "talk about what might be going on, how the main character might be feeling, and how you can make him feel better." The participants were then told that the researcher would be back in a few minutes to ask the dyad what they think is the best method for the child in the story to make themselves feel better. Conversations were video-recorded and monitored through a television in the other room. Researchers returned to the room after three minutes of discussion. These conversations were transcribed and coded for parent elaborations (information about emotions), scaffolding (helping child to generate emotion regulation strategies), and emotion regulation strategy generation as well as child emotion regulation strategy generation. Please see the coding section below for more details, as well as Appendix E for the script used by the researchers.

Parent-child frustrating Lego task. The frustrating task from Melnick and Hinshaw (2000) was adapted for use in this study. Parent-child dyads were asked to re-create two Lego figurines (a crocodile and a tiger). To enhance motivation, children were told they would receive a previously chosen prize if they could make both figurines "exactly right."

Visual instructions were provided. The crocodile was always presented first with no manipulated pieces to create success for the child. During the assembly of the tiger, three pieces were glued together, making it challenging for the dyad to move on to the next step. Dyads were video-recorded and monitored over a television screen. Two minutes after the stuck pieces were discovered, researchers came back into the room, apologized, and found a replacement piece for the child and their parent. This task was coded for child and parent behaviour and emotion. Please see the coding section below and Appendix F for more details.

Coding

Coding for the vignette task. The parent-child vignette discussions were transcribed by two undergraduate research assistants. Each video was transcribed by one research assistant and reviewed by the second research assistant for accuracy. The transcriptions were then coded by me. During the vignette discussion task, child speech was coded for the frequency of positive emotion words (e.g., happy, excited), negative emotion words (e.g., angry, sad), and generated emotion regulation strategies (e.g., ask his mom for help). Coded parent speech included counts of positive emotion words, negative emotion words, generated emotion regulation strategies, emotion word elaboration (e.g., he is sad because his friend is being bullied) and scaffolding of child emotion regulation strategy generation.

Generated strategies. Child and parent emotion regulation strategy codes were created after examining coding systems that were used in frustrating situations and parent-child discussions with children with and those without ASD (Jahromi et al., 2012; Lougheed et al., 2015; Melnick & Hinshaw, 2000; Morelen & Suveg, 2012). The categories of emotion regulation strategy codes from Jahromi et al.'s (2012) coding system were used with some adaptation after examining transcripts. If any member of the dyad's suggestion for a strategy fit with one of the definitions of the coding system, then it was counted as one generated strategy. Please see Table 3 for specific strategies and definitions.

Table 3: Vignette emotion regulation strategy codes

Behaviour	Definition
Support Seeking	Support seeking is defined as actions undertaken by the child in order to get support from their parent in some way in order to solve the task or support their emotions; can be verbal or physical.
Problem Solving	Problem solving is defined as efforts taken by the child to solve the problem of the missing pieces. This may include defining the problem coming up with alternative strategies, and/or persisting on the task.
Not Engaging	Not engaging is for those strategies where *not engaging would be helpful* in fixing the problem. It is not distraction but instead are strategies such as walking away from an aggressor, ignoring the problem, or worry thoughts.
Venting	Venting is defined as the release of tensions, frustrations, or disappointment by the child.
Avoidance	Avoidance is defined as deliberate attempts to try to get out of completing the task.
Distraction	Distraction is defined as shifting attention away from the Lego in order to pay attention to something else.
Self-Soothing	Self-soothing is defined as behaviour (generally repetitive) that functions to calm participant down.
Self-Talk	Self-talk is defined as talking to self to get through task or emotions. Child can be mumbling to self/may or may not be audible.
Cognitive Reappraisal or Acceptance	Cognitive reappraisal and acceptance are defined as reframing situation into something more positive, or accepting the situation, trying to find a bright side.
Behavioural Strategies	These are strategies used for anxiety/anger such as deep breathing, muscle relaxation, and meditations

Emotion words and elaborations. Coding of emotion words and emotional elaborations was adapted from Shields, Lunkenheimer, and Reed-Twiss (2002). All words referring to feeling states were counted as one emotion word. Less specific words such as “good” or “bad” also counted if they were referring to a person’s feelings and not to another aspect of the conversation (such as the type of person someone is). Emotional elaborations are questions asked, or statements made by the parent that help the child to further understand emotions felt in the vignette. According to Shields et al (2002), “To be scored an elaboration, a statement must include a specific emotion word, or refer to the emotional quality of the event (a good time, a difficult time, a really bad day), or take place in the context of an emotional conversation.” Questions and statements may refer to the who, what, where, and why a person is feeling a certain way.

Emotion regulation scaffolding. After the inspection of transcripts, a code titled emotion regulation scaffolding was added to the coding system to account for the structure and support parents provided to their child in generating emotion regulation strategies. Similar to emotion elaborations above, scaffolding is anything the parent does to help the child understand or generate specific emotion regulation or problem-solving strategies for the children in the vignettes (rather than understanding of the emotions themselves). These could be statements or questions such as “How could James feel better?” Or, anything about the who, what, where, when, how, and why a certain strategy could or should be used, or if the parent reflected/ repeated, or praised what the child said.

Reliability. The transcriptions for the vignettes were coded by me. An undergraduate research associate blind to child diagnosis and study hypotheses coded approximately 25% of the transcriptions (n = 10) to assess reliability. Because frequencies were used, intraclass correlation coefficients were calculated as a measure of interrater reliability. Calculated two-way random effects intra-class correlation coefficients for absolute agreement ranged from .715 to .980. Two-way random effects model of absolute agreement was chosen for an ICC calculation to examine the extent both raters made the same rating and reliability could be generalized to other raters with similar characteristics. These calculated numbers fall into the good to excellent range of values (Cicchetti, 1994). Please see Table 4 for interrater reliability values for each variable.

Table 4: Intraclass correlation coefficients for the vignette task

Variable	ICC
Parent negative words	.980
Parent positive words	.715
Parent elaborations	.932
Parent scaffolding	.797
Parent strategies	.910
Child negative words	.929
Child positive words	1.00
Child strategies	.976
Dyad strategy	.958

Coding for the Lego task. The coding systems of Jahromi et al. (2012), Kring & Sloan's (1991) and Morris et al. (2011) were adapted for this study. The coding definitions are described below in Table 5. The two minutes following identification of the stuck pieces was divided into 12 x 10-second intervals. Ten-second interval coding was chosen over a global coding system specifically to examine contingent parent-child behaviours from one interval to the next. The presence or absence of the behaviours below was coded for each interval.

Both parent and child emotional expressions were coded on a three-point scale (1 = positive expression, 2 = neutral expression, 3 = negative expression). If more than one expression was present, each was coded. For some analyses, the most negative expression in each interval was used (Kring & Sloan, 1991). Parent behavior captured by the coding system included problem solving strategies, emotional support, praise, encouragement, unhelpful behavior, cognitive reappraisal, and attention. Child behaviour included in the coding system included problem solving strategies, support seeking, venting, cognitive reappraisal, and attention. Dyad codes included whether the dyad worked together for none, half, or most of the interval, and who was mostly working on the problem of stuck pieces (mostly parent, mostly child, 50/50, neither).

Table 5: Lego task coding definitions

Name	Definition	Parent	Child	Dyad
Attention	Where is the individual's attention? On the Lego in their own hand, Lego in the other person's hand, on the other person, or elsewhere	×	×	
Problem solving	Problem solving is defined as efforts taken by the child to solve the problem of the missing pieces. This includes defining the problem coming up with strategies to complete the task according to the instructions, and/or persisting on the task.	×	×	
Emotional support	behaviour that parents engage in to support their child's emotions, such as providing comfort, validating their child's emotions, and engaging in emotion self-talk	×		
Praise and encouragement	Any positive things the parent says to the child to reinforce them	×		
Unhelpful behaviour	Unhelpful parental structuring of the task occurs when parent's behaviour is taking away from the collaborative approach. This occurs when the parent takes over the task, leaving little for the child to do	×		

Name	Definition	Parent	Child	Dyad
Cognitive reappraisal	Cognitive reappraisal and acceptance are defined as reframing situation into something more positive or accepting the situation, or providing an explanation for the situation	×	×	
Support seeking	Actions undertaken by the child in order to get support from their parent or experimenter in some way (examples below) in order to solve the task or support their emotions; can be verbal or physical		×	
Venting	Venting is defined as the release of tensions, frustrations, or disappointment by the child.		×	
Working together?	How long in each interval is the dyad working together? Is it none of the time, half of the time, most of the time			×
Who is working?	Who is actively working on the stuck pieces? Is it mostly the parent, mostly the child, 50/50, or neither			×

Reliability. The videos were coded by me. A post-doctoral fellow blind to child diagnosis and study hypotheses coded 25% of the videos (n = 10) to assess reliability. Given that the frequency of coded behaviour as well as specific instances of behaviour were used, intraclass correlation coefficients and Cohen's Kappa values were both calculated. Two-way random intra-class correlation coefficients for absolute agreement ranged from .66 to 1.0. Kappa values ranged from .64 to 1.00.These calculated numbers fall into the good to excellent range of values (Cicchetti, 1994). See Table 6 for a complete report of reliability coefficients

Data examining a change in emotion from one 10 second interval to another was also coded by myself and an undergraduate research assistant (decrease, increase, no change). Specific instances of behavior and frequencies/totals were also important for the research questions so both Cohen's Kappa and intraclass correlation coefficient values were computed. Two-way random absolute agreement ICC values were calculated to range from .986 to 1.00. Cohen's Kappa was .991. The values fall into the excellent range (Cicchetti, 1994). There was one disagreement, which was found and changed to the correct classification after discussion. Please see Table 6 for full interrater reliability values for each variable.

Table 6: Reliability for the Lego task

Name	Kappa	ICC
Child Attention		
Parent	1.00	1.00
Parent Lego	.823	.879
Own Lego	.877	.967
Other Lego	.895	.934
Elsewhere	.912	.866
Child Problem solving		
Instructions	.867	.836
Stuck	.909	.961
Other Lego	.887	.933
Other	.684	.904
Cognitive reappraisal	1.00	1.00
Child Support seeking	.804	.852
Child Venting	.913	.944
Child Talking	.784	.785
Child Positive Emotion	.899	.935
Child Neutral Emotion	.884	.959
Child Negative Emotion	.803	.828
Who is unsticking?		
Mostly Parent	.947	.950
Mostly Child	.905	.948
50/50	.879	.690
Neither	.855	.816
Working together?		
None	.787	.768
Half	.640	.663
Most	.793	.927
Parent Emotional Support	.655	.883
Parent Praise and Encouragement	No instances during reliability videos	No instances during reliability videos
Unhelpful behaviour	.757	.899
Parent Attention		
Child	.903	.930
Child Lego	.814	.909
Own Lego	.981	1.00
Other Lego	.912	.967
Elsewhere	.859	.910
Parent Problem solving		
Instructions	.925	.958
Stuck	.943	.964
Other Lego	.959	.977
Other	.818	.825
Parent Cognitive reappraisal	1.00	1.00
Parent Talking	.883	.913
Parent Positive Emotion	.944	.957
Parent Neutral Emotion	Not calculated-- % agreement is 98.25%	.964

Name	Kappa	ICC
Parent Negative Emotion	.879	.895
Change from Previous Emotion	.991	--
Change in Emotion Decrease	--	1.00
Change in Emotion Increase	--	.986
Change in Emotion No Change	--	.998

Results

Initial Inspection

All data analyses were conducted in IBM SPSS Statistics 24. The distributions of the data were inspected. Normality was assessed using the Shapiro-Wilk test and inspection of histograms. Where parametric statistical test assumptions (e.g. of normality) were not met, alternate non-parametric statistics were used. Poisson regression was used specifically for count data. Specific analyses used for examining each research question are identified below.

Given the small sample size and preliminary nature of the study (i.e., no other parent-child studies have examined group differences in this age group), it was decided that results with p-values less than .1 would be interpreted for the purposes of the study. This will allow certain results to be highlighted and targeted for future inquiry. Effect sizes are also provided to help interpret the results. All results are provided in tables below.

Count Data and Poisson Regression

When count data were used as an outcome variable, Poisson regression was used. Poisson regression is ideal for count data as count data are often positively skewed. Poisson regression assumes the variance and mean of the outcome variable have the same value (equidispersion). If this is not the case, data are described as either over or under dispersed. To examine dispersion, the Lagrange Multiplier Test was used. If the data were found to be overdispersed, negative binomial regression with maximum likelihood estimation was used instead. This allows for an estimation of the dispersion parameter rather than assuming the dispersion parameter equals one (mean = variance; as in Poisson regression).

Studentized Pearson residuals were plotted against predicted mean values to examine whether the correct form of the relationship between variables was modelled. These scatter plots were visually inspected for a “cloud-like” shape. Additionally, Cook’s distances, leverage values, and predicted mean values and residuals were also inspected. These values were plotted with q-q plots; if there were significant vertical “jumps” in these plots, analyses were re-run without those cases to examine influence. If

there was no influence on the regression equation, one set of results including all cases was reported. If there was influence on the results (e.g., change in p-values or regression coefficient values), then both sets of results were reported and explanations were provided in the discussion.

To account for the individual differences in coded intervals and conversation turns between participants, the natural logarithm of these variables was entered into the regression model as offset variables. Which variable was chosen depended on the research question, allowing for rates of target variables to be analyzed.

Poisson regression with a loglinear link was used in the current study through the Generalized Linear Models Function in SPSS 24. Exponentiated Poisson regression coefficients are presented in the results section. This allows the interpretation of regression coefficients as rate ratios.

Lego Task: Initial Description

During the Lego task, most participants were coded for all twelve intervals. A subset of participants was off screen for a part of the time (n = 9; 5 ASD, 4 TD). Reasons for being offscreen included coming to find the researcher to tell them the pieces were stuck together and looking for something in the room to help break apart the pieces. Additionally, two dyads could not be coded for the entire two minutes because they had contact with the researcher during the task. It was determined that any behaviour after talking to the researcher would be influenced by the conversation; therefore, behaviour after contact with the researcher was not coded. Two more dyads did not need the researcher's help with the stuck pieces because they either substituted another piece or used the stuck piece anyways. Analyses were run with and without the data from these two dyads. Overall, without these two dyads, effects were in the same direction; however, statistical power was affected as evidenced by increased p-values. Given the smaller sample size and similar pattern of results with and without the inclusion of these dyads, the data presented below includes all data unless otherwise indicated. As mentioned previously, one dyad was excluded/not coded due to the stuck pieces breaking apart.

Within the Lego task, four variables were observed in less than five percent of the intervals: parent emotional support, parent praise/encouragement, child cognitive reappraisal, parent cognitive reappraisal. These variables were not used in the main analyses examining mean group differences due to their rare appearance in this sample. Mean values for each of these variables ranged from .05-.55, which means these behaviours were observed in less than one interval on average. Problem solving variables (working on unstuck piece, using instructions, using other pieces, and other strategies) were examined to assess whether they could be combined to create one overall problem solving behaviour. Kendall's Tau-b correlations suggested zero to small positive and negative associations between problems solving variables. As a result, these codes were not combined. A similar outcome was found when examining correlations between parent problem solving behaviours. Please see Table 7 for more details.

Table 7: Correlations between problem solving variables

	Instructions	Stuck Piece	Other Lego	Other
Instructions	--	.03	.32*	-.10
Stuck Piece	*-.45**	--	-.13	.13
Other Lego	*-.03*	*.12*	--	-.20
Other	*-.36**	*.25**	*.32**	--

Note. * p<.1, parent correlations are below the diagonal (italics), child correlations are above the diagonal.

Finally, there was no mean difference between children with and without ASD in speaking with their parent (t = .56; p = .58; d = .18). Similarly, there was no group difference in the mean amount that parents spoke to their children (Mann Whitney U = 285.50; p = .10; r = .26).

Discussion Task: Initial Description

During the discussion task, most participants spoke for the full three minutes. In some cases, the parent or child informed the researcher that they could not speak anymore, or their child did not want to speak anymore; the discussion then ended early. There were three vignettes (two dyads) in the group of children without ASD and seven vignettes (five dyads) in the group of children with ASD where the discussion ended early. Additionally, some parents and children spoke as they were reading the story (i.e., interjected with comments), and others asked for additional time to continue their discussion. Parents of children with ASD spoke 137 more words on average than

parents of children without ASD (U = 301.50, p = .02 , r =.37), despite a similar number of conversation turns (U = 210.50, p = .99; r = .002) and more dyads of children with ASD finished before three minutes of discussion. Children with ASD also spoke less (75 less) than children without ASD (U = 142.00 p = .08; r = - .28), even though both groups of children used a similar number of conversation turns (U = 207.50, p = .95, r = - .01).

Within the parent-child discussion task, variables were also inspected to see if the same variables during the anxiety-related and anger-related vignettes could be combined. Within the parent variables (elaborations, scaffolding, strategies), variables had small associations based on Kendall's Tau-b. Alpha values were also calculated and ranged from .74 (parent strategies) to .51 (child strategies). Cronbach's alpha is not the most appropriate value for count data and may misrepresent true internal consistency of data when used with Poisson regression. As a result of the small Tau-b values and the lower alpha values, variables were not generally combined across discussion topics. One overall dyad strategies variable was created by combining strategies generated by both parent and child across both discussion tasks for Research Question Six; however, the results from the analysis using that variable need to be interpreted with caution because the alpha value is .68 and may be a misrepresentation. Similarly, none of the child variables were combined due to small Kendall's Tau-b values. Please see Table 8 for more details.

Table 8: Correlations between discussion task variables

	1	2	3	4	5	6	7	8
1. C Strat Anger	--							
2. C Strat Anxiety	.30*	--						
3. P Strat Anger	.18	.19	--					
4. P Strat Anxiety	.17	.21*	.35*	--				
5. P Elab Anger	-.18	-.24*	-.24*	-.05	--			
6. P Elab Anxiety	-.17	-.21*	-.09	.20	.14	--		
7. P Scaf Anger	.37*	-.06	-.02	.09	.11	-.05	--	
8. P Scaf Anxiety	.29*	.23*	.05	.16	-.06	.18	.36*	--

Note. C = Child, P = Parent, Strat = Strategy, Elab = Elaboration, Scaf = Scaffolding, * p <.1

Associations with age and IQ

Correlations between age, IQ, and outcome variables were examined. As age and IQ are associated with various variables of interest (e.g., Ting & Weiss, 2017; Fenning et al., 2018), correlations between these two variables and all other variables of interest

were considered. Age was slightly negatively skewed due to a large number of 11-year-olds in the sample. Because assumptions of bivariate normality were violated, Kendall's Tau-b was used to examine associations, as needed.

Correlations between child age and parent-reported variables. Child age was not associated with any parent report measures: BASC-2 externalizing and internalizing, SRS-2, MSCS ER, MSCS Total, and SCAS-P. Please see Table 9 for full correlations.

Table 9: Correlations between age and parent-reported variables

	BASC-INT	BASC-EXT	SCAS-P	SRS-2	MSCS ER	MSCS Total
Age	.02	.02	.03	-.01	.10	-.01

Note. INT = internalizing, EXT = externalizing

Associations between child age and vignette variables. Age was associated with parent scaffolding during the anxiety discussion (T = .22, p = .05). There were no associations between age and any other anxiety or anger discussion variables. Table 10 contains all correlations.

Table 10: Correlations between age and vignette variables

	Child Strategies		Parent Anger			Parent Anxiety		
	Anger	Anxiety	Strategies	Elab	Scaf	Strategies	Elab	Scaf
Age	.01	.12	.06	-.06	-.09	-.04	-.15	.22

Note. Elab – Elaborations, Scaf = Scaffolding.

Correlations between child age and Lego variables. Child age was associated with parents mostly unsticking the Lego piece, (T = -.38, p < .01), children using instructions (T = .24, p = .04), children focusing on the stuck piece (T = .24, p = .04), overall child emotion (T = .28, p = .02), and no one working on the stuck piece (T = -.25, p = .04). See Tables 11-14 for more information.

Table 11: Correlations between age and child Lego variables

	Instructions	Stuck	Other Lego	Other	Vent	Support	Cog	Talk
Age	.24*	.24*	.17	.06	-.01	-.18	.05	.17

Note. Stuck = Stuck Piece, Vent = Venting, Support = Support Seeking, Cog = Cognitive Reappraisal, Talk = Talking to Parent, *p< .1

Table 12: Correlations between age and parent Lego variables

	Instructions	Stuck	Other Lego	Other	Unhelpful	Support	Cog	Talk	Praise
Age	-.07	-.16	.04	.03	-.00	-.03	-.07	-.08	-.10

Note. Stuck = Stuck Piece, Vent = Venting, Support = Emotional Support, Cog = Cognitive Reappraisal, Talk = Talking to Child, *p<.1.

Table 13: Correlations between age and child emotion

	Positive	Neutral	Negative	Overall
Age	-.05	.20	.09	.28*

Table 14: Correlations between age and dyad variables

	Who is unsticking the pieces?				Is the dyad working together?		
	Parent	Child	50/50	Neither	None	Half	Most
Age	-.38*	.17	.14	.17	-.25*	.05	.15

Note. Parent/child refers to the parent/child mostly unsticking the pieces. None = the dyad worked together for none of the time, Half = they worked together half of the time, Most = they worked together most of the time, *p <.1.

Correlations between IQ and parent-reported variables. IQ was correlated with Total SRS-2 scores (r = -.36, p = .02) and MSCS total score (r = .31, p = .05). No other associations were found. Please see Table 15 for all values.

Table 15: Correlations between IQ and parent-reported variables

	BASC-INT	BASC-EXT	SCAS-P	SRS-2	MSCS ER	MSCS Total
IQ	.02	-.13	-.03	-.36*	.12	.31*

Note. INT = internalizing, EXT = externalizing, * p <.1.

Correlations between IQ and vignette variables. IQ was correlated with parent scaffolding during the anger discussion (T= -.23, p = .04) and during the anxiety discussion (T = -.24, p = .04). Please see Table 16 for all values.

Table 16: Correlations between age and vignette variables

	Child Strategies		Parent Anger			Parent Anxiety		
	Anger	Anxiety	Strategies	Elab	Scaf	Strategies	Elab	Scaf
IQ	.18	.19	-.03	-.18	-.23*	-.15	-.14	-.24*

Note. Elab – Elaborations, Scaf = Scaffolding. * p<.1.

Correlations between IQ and Lego variables. IQ was associated with parent focusing on other pieces (T = -.24, p = .04), and how much they spoke to their child (T = -.41, p = .001). Please see Tables 17-20 for all values.

Table 17: Correlations between IQ and child Lego variables

	Instructions	Stuck	Other Lego	Other	Vent	Support	Cog	Talk
IQ	.00	.04	-.08	-.06	-.19	-.01	.09	-.08

Note. Stuck = Stuck Piece, Vent = Venting, Support = Support Seeking, Cog = Cognitive Reappraisal, Talk = Talking to Parent.

Table 18: Correlations between IQ and parent Lego variables

	Instructions	Stuck	Other Lego	Other	Unhelpful	Support	Cog	Talk	Praise
IQ	-.05	-.04	-.24*	.00	-.05	-.09	.13	-.41*	-.07

Note. Stuck = Stuck Piece, Vent = Venting, Support = Emotional Support, Cog = Cognitive Reappraisal, Talk = Talking to Child. *p <.1.

Table 19: Correlations between IQ and child emotion

	Positive	Neutral	Negative	Overall
IQ	.18	-.05	-.09	-.15

Table 20: Correlations between IQ and dyad variables

	Who is unsticking the Pieces?				Is the dyad working together?		
	Parent	Child	50/50	Neither	None	Half	Most
IQ	-.08	-.01	.15	-.12	-.02	-.08	-.07

Note. Parent/child refers to the parent/child mostly unsticking the pieces. None = the dyad worked together for none of the time, Half = they worked together half of the time, Most = they worked together most of the time.

Research Question 1

How do parents of school-aged children with ASD interact with their children in a frustrating situation, and do they react differently than parents of typically developing children?

Mean group differences in parent behaviour were examined using the following variables: 1) unhelpful behaviour, 2) using/looking at instructions, 3) working on the stuck piece, 4) working with other Lego, 5) and other strategies. Please see Table 21 for

the mean values and standard deviations for each of these variables. With the exception of unhelpful behaviour, (see below), either Poisson regression or negative binomial regression was used to address the research question. Diagnosis was entered into the model as a predictor variable, and the offset variable was the number of coded intervals.

Table 21: Coded parent behaviour means

Variable	ASD Mean (SD)	TD Mean (SD)
Unhelpful Behavior	1.35 (2.581)	.90 (1.804)
Instructions	4.80 (2.783)	5.20 (2.876)
Stuck Piece	6.30 (2.774)	6.75 (3.492)
Other Lego	4.05 (2.704)	3.55 (2.481)
Other	1.70 (1.976)	1.45 (1.395)
Emotional Support	.15 (.366)	.15 (.671)
Praise/Encouragement	.20 (.696)	.05 (.224)
Cognitive Reappraisal	.30 (.571)	.55 (.826)
Talk to Child	10.65 (1.309)	9.85 (1.755)

Note. These mean values do not account for number of intervals coded. That is addressed in the regression analyses below.

Unhelpful Behaviour. A Mann-Whitney U-test was used to examine mean group differences in unhelpful behaviour. The total number of intervals where unhelpful parent behaviour was coded was first divided by the total number of intervals for each participant. The mean for the TD group was .08 (SD = .16), and the mean for the ASD group was .12 (SD = .23). Effect size (r) was calculated by dividing the standardized test statistic by the square root of number of dyads. Result suggest no mean group differences unhelpful behaviour (U = 205.50, p = .88, r = .03).

Instructions: Poisson or Negative Binomial regression was used for the remainder of the analyses in Research Question One. When examining group mean differences in instruction use, a negative binomial model was constructed; however, fit statistics and pattern of the results did not indicate an improvement over the Poisson model. Data presented in Table 22 use Poisson regression with robust estimation of covariance to account for the overdispersion in the model (likelihood ratio $\chi^2 = 1.08$; p=.30). No other interpretations were made.

Stuck piece. The likelihood ratio χ^2 of the overall model was 1.20 (p = .27). Please see Table 22 for more details.

Other Lego. The overall model's likelihood ratio χ^2 was 5.85 (p = .05). IQ was included in addition to diagnosis as a predictor. For every one-point increase in IQ, parents were .98 times as likely to focus on other Lego outside of the stuck pieces (decrease by 2%; exp(B) = .98; Wald χ^2 = 5.65, p = .02). Please see Table 22 below for more information.

Other. The likelihood ratio χ^2 of the overall model was .02 (p = .88). Please see Table 22 for more details.

Summary. Overall, data suggest very small effect sizes when examining mean group differences in parent behaviour (5% to 16% change between groups; Table 22). This translates to a difference in parent behaviour during .6 to 1.92 intervals on average, which is not a meaningful difference. Parents in both groups were more likely to increase focus on Lego outside of the stuck piece when their child's cognitive functioning was higher. One-point increases in IQ are not meaningful differences. When examining an increase in one standard deviation (15 IQ points), however, focus on other Lego was likely to decrease by 30%.

Table 22: Regression—Parent behaviour

Dependent Variable	Test	Pearson χ^2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI (ExpB)	Wald χ2 (df)
Instructions	P	1.62	-99.37	202.75	1.08 (1)	1.72*					
intercept							-.88	.13	.41	.32-.53	46.13*
diagnosis							.15	.17	1.16	.83-1.63	.72
Stuck	P	1.59	-106.63	217.27	1.20 (1)	1.25					
intercept							-.61	.09	.54	.46-.65	46.96*
diagnosis							.14	.12	1.15	.90-1.46	1.20
Other Lego	P	1.98	-95.72	197.441	5.85+ (1)	1.44					
intercept							.69	.73	2.00	.47-8.4	.89
IQ							-.02	.01	1.05	.97-1.00	5.65*
diagnosis							.05	.17	.98	.75-1.47	.09
Other	NB	1.026	-68.15	142.30	.02 (1)	2.06*					
intercept							-1.93	.24	.15	.09-.231	65.35*
diagnosis							-.05	.35	.95	.48-1.88	.02

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, AIC = Aikake's Information Criterion, LM = Lagrange Multiplier, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Research Question 2

How do children with ASD respond to frustrating situations when with their parents, and is this different than responses of typically developing children?

Group differences were examined for the following variables 1) stuck piece, 2) instructions, 3) other Lego, 4) other problem solving, 5) venting, 6) support seeking, 7) positive emotion, 8) negative emotion. Poisson regression or Negative Binomial regression were used to examine mean group differences. Each of the above variables was an outcome variable for individual regression analyses. The number of intervals coded was included as an offset variable. The mean number of times a variable was coded is presented for each group in Table 23 below.

Table 23: Mean of each child variable during the Lego task

Variable	ASD Mean (SD)	TD Mean (SD)
Instructions	3.70 (2.54)	4.75 (2.99)
Stuck piece	4.00 (3.00)	3.80 (1.91)
Other Lego	4.00 (3.08)	4.25 (2.81)
Other	.90 (.72)	1.05 (1.32)
Vent	1.10 (1.334)	1.30 (1.22)
Support	1.45 (1.77)	1.20 (.84)
Cognitive reappraisal	.30 (.979)	.20 (.41)

Stuck. Age was also included in the regression equation, as it was correlated with time spent working on the stuck pieces. The likelihood ratio χ^2 was 6.86 for the overall model ($p = .08$). A very small effect of age was found. For every one-year increase in age, children were 1.15 times more likely to focus on the stuck piece (15% increase; exp(B) = 1.15, Wald $\chi^2 = 6.58$; $p = .01$). Please see Table 24 for more information.

Instructions. Age was included in the Poisson regression equation as it was correlated with time spent working on the stuck pieces. The overall model likelihood ratio χ^2 was 10.64 ($p = .005$). For every increase in one year of age, children across both groups were 1.14 times more likely to use instructions in an interval (14% increase; exp(B) = 1.14; Wald $\chi2 = 6.20$, $p = .01$). When examining diagnosis, TD children were 1.44 times more likely to use the instructions compared to children without ASD (44% more use in TD group; exp(B) = 1.44, Wald $\chi^2 = 5.43$, $p = .02$). Please see Table 24 for more details.

Other Lego. The overall model is presented in Table 24 (likelihood ratio $\chi^2 = .33$; $p = .56$). No other interpretations were made.

Other. The overall model when predicting other problem-solving strategies is presented in Table 24 (likelihood ratio $\chi^2 = .48$; $p = .49$). No other interpretations were made.

Venting. The overall model is presented in Table 24 (likelihood ratio $\chi^2 = .66$; $p = .42$). Two points of potential influence were found while examining Cook's distances for these data and elimination of participants on this basis changed the pattern of results. Both outlying participants were in the ASD group and had the highest instances of venting in the sample. When these points were removed, the model fit statistics improved, chi-squared statistics increased, and p-values decreased. The overall likelihood ratio χ^2 equaled 3.17 ($p = .08$). Children in the TD group were estimated to vent 1.78 times more compared to children with ASD (78% increase; exp(B) = 1.78, Wald $\chi2 = 3.03$, $p = .08$). Full results may be found in Tables 24.

Support. Family income was included in the regression equation. The omnibus test likelihood ratio χ^2 was 8.63 ($p = .13$). Please see Table 24 for more details.

Table 24: Regression—Child behaviour

Variable	test	Pearson χ^2/df	LL	AIC	LR χ2 (df)	LM z-value	B	SE	ExpB	95% CI	Wald χ2
Instructions	P	1.51	-90.04	186.07	10.64* (2)	1.00					
intercept							-2.52	.57	.08	.03-.25	19.37*
diagnosis							.36	1.57	1.44	1.06-1.96	5.43*
age							.13	.05	1.14	1.03-1.26	6.20*
Stuck	P	1.28	-85.13	176.26	6.859* (2)	1.01					
intercept							-2.54	.59	.08	.03-.25	18.25*
diagnosis							.07	.16	1.07	.78-1.47	.17
age							.14	.05	1.15	1.03-1.28	6.56*
Other Lego	NB	.98	-93.85	193.69	.33 (1)	2.24*					
intercept							-1.07	.16	.34	.25-.47	47.46*
diagnosis							.13	.22	1.14	.74-1.74	.334
NB							.23	.12			
Other	P	1.12	-52.03	108.39	.48 (1)	.41					
intercept							-2.56	.24	.08	.05-.12	117.63*
diagnosis							.221	.32	1.25	.67-2.34	.47
Venting	P	1.27	-58.61	121.22	.66 (1)	1.13					
intercept							-2.36	.21	.095	.06-.14	122.09*
diagnosis							.23	.29	1.26	.72-2.23	.65
Venting (no outliers)	P	1.05	-50.09	104.17	3.17* (1)	.19					
intercept							-2.70	.27	.07	.04-.11	101.95*
diagnosis							.58	.33	1.78	.93-3.41	3.03*
Support	P	1.34	-54.29	120.57	8.63 (5)	.31					
intercept							.34	.27	1.40	.82-2.38	1.55
income 1							.07	.64	1.07	.31-3.74	.01
income 2							-.89	.57	.41	.13-1.26	2.43
income 3							.46	.40	1.58	.72-3.45	1.31
income 4							.31	.38	1.36	.65-2.84	.66
diagnosis							-.19	.36	.82	.41-1.66	.29

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Positive emotion. The overall model's likelihood ratio χ^2 was 8.68 (p = .003). Children in the TD group were 3.79 times more likely to display positive emotion than children with ASD during the frustrating situation (279% more in TD group; exp(B) = 3.79, Wald χ^2 = 9.75; p = .002). The full results are presented in Table 25.

Neutral emotion. Every child displayed a neutral facial expression in each 10 second interval. No analyses were run to examine group differences.

Negative Emotion. The omnibus test likelihood ratio χ^2 equaled .67 (p = .41). Please see Table 25 for more information.

Table 25: Regression—Child emotion

Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Positive	NB	.94	-59.91	125.821	8.68* (1)	2.47*					
intercept							-2.95	.35	.052	.026-.103	71.93*
diagnosis							1.33	.43	3.79	1.643-8.775	9.748*
NB							.76	.42			
Negative	NB	.98	-57.26	120.53	.67 (1)	1.26					
intercept							-2.19	.27	.11	.07-.19	63.91*
diagnosis							-.340	.41	.71	.32-1.60	.67
NB							.72	.43			

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Summary of Research Question 2. There were several similarities and differences between groups when examining child behaviour and emotion during the Lego task. Differences in rate of behaviour ranged by 7-44% between the two groups (see Table 24). The largest and most meaningful difference was found for instruction use. Typically developing children used the instructions and other strategies more than children with ASD. Typically developing children on average displayed more venting behaviour compared to children with ASD in addition to more positive emotion overall. In terms of effect size, these differences were all small. Future research with a larger sample size and more statistical power will be helpful to fully understand mean group differences. These results will be discussed in the Discussion chapter.

Research Question 3

In families with children with ASD, which parenting behaviours are helping to co-regulate child emotions during a frustrating situation, and is this different when compared to TD children?

Yules Q

In order to answer Research Question Three, Yule's Q values were calculated to examine the contingency between parent behaviour in one 10 second intervals and a reduction in child negative emotion intensity in the next 10 second interval. Following guidelines from Bakeman & Quera (2011), Yoder & Symons, (2010) and Jahromi et al.'s (2012) study, Yule's Q values were calculated for each parent variable during the Lego task. Yule's Q values range from -1 to +1 and similar guidelines regarding strength of effect have been adopted as to those of Pearson product moment correlation, i.e., .6, .43, and .2 are viewed as large, moderate, and small effects, respectively (Bakeman & Quora, 2011; Yoder & Symons, 2011).

Table 26: Yule's Q calculation and contingency table example

	Yes Intensity decrease	No Intensity decrease (i.e., other parent talk or child talk)
Yes Parent regulation facilitation	A	B
No parent regulation facilitation (i.e., other parent talk or child talk)	C	D

As indicated above, Yule's Q is calculated from contingency tables. In contingency tables, the hypothesized antecedent behaviour is generally represented in the rows, and the target behaviour is represented in the columns (Yoder & Symons, 2011). The following equation was used to calculate Yule's Q:

$$Q = (ad-bc)/(ad+bc)$$

If the association is in the positive direction, it means that the observed contingent behaviour occurs at a level greater than chance, where a negative value means the contingent behaviour occurs at a rate less than expected by chance. Values close to zero mean the contingency occurs at a rate close to chance.

Given that there were some low incidence variables, it was not possible to calculate a Yule's Q value for every participant—instead values were calculated by group (ASD & TD). The results below are calculated Yule's Q values examining a decrease in negative emotion from one interval to the next, when a specific parent behaviour was identified in the first interval. The following specific parent strategies were assessed to determine if they were appropriate in a Yule's Q analysis: emotional support, praise/encouragement, unhelpful behaviour, instructions, stuck piece, other Lego, other problem solving, and cognitive reappraisal. Of these nine variables, only instruction use, stuck piece, and other Lego were determined to have enough expected frequencies in each cell of the contingency table (5; Yoder & Symons, 2010) and a Fisher's Exact Test was used for the remaining variables, as it can be used with smaller expected frequency values.

Yules Q. Table 27 displays the Yule's Q values for the full sample, the ASD group and the TD group.

Table 27: Yule's Q values

Parent behaviour	TD	ASD	Full sample
Instructions	-.29	-.30	-.28
Stuck piece	-.12	.24	.05
Other Lego	.44	-.56	.03

Instructions. Instruction use by parents as a strategy to solve the problem of the stuck piece had small negative sequential associations with a decrease in child negative expression in the next interval. This means that more decreases in negative emotion

were associated with less instruction use. This effect was found across the whole sample and within each group. Referencing or using instructions does not appear to be a helpful strategy for reducing negative emotion in children in both groups.

Stuck Piece. Focusing on the stuck piece as a strategy by parents was negatively associated with a decrease in negative emotion for the TD group. More decreases in negative emotion were associated with less focus on the stuck piece. For the ASD group, there was a small positive sequential association. When parents focused on the stuck piece, children with ASD were more likely to demonstrate a decrease in negative emotion in the next interval. This strategy was helpful for children with ASD, but not children without ASD. See Table 27.

Other Lego. For children without ASD, parent use of other Lego as a problem-solving strategy was associated with a decrease in child negative emotion in the next interval. This was a medium effect. In the ASD group, the association between other Lego and instruction use by parents was a medium negative association where less use of other Lego was associated with more decreases in negative emotion in the next interval. Focusing on other Lego was helpful for TD children, but not with ASD. See Table 27.

Fisher's Exact Test. Fisher's exact test was used to examine the association between parent behaviour in one interval and a decrease in child negative emotion in the next interval. Fisher's Exact Test also examines association between two categorical variables using a 2x2 contingency table and is appropriate when expected frequencies are less than five. Unlike Yule's Q, Fisher's Exact Test only provides information about whether an association exists, not the strength of association. Table 28 provides p-values (two sided) for each variable. Cramer's V values were calculated as an estimate of effect size.

Table 28: Fisher's Exact Test results

Variable	TD		ASD		Full sample	
	p-value	Cramer's V	p-value	Cramer's V	p-value	Cramer's V
Emotional Support	.088*	.23	1.00	.03	.28	.06
praise/encourage	1.00	.02	1.00	.04	1.00	.03
unhelpful	1.00	.03	.673	.02	1.00	.006
Other problem solving	1.00	.001	1.00	.01	1.00	.008
cognitive reappraisal	.604	.07	.043*	.20	.33	.04

Emotional support. There was a small association between parent emotional support and decrease in child negative emotion in the next interval for TD children and their parents (V = .23, p = .09). There was no association in the ASD group.

Praise/Encouragement. There were no associations between praise/encouragement and decrease in child negative emotion in either group.

Unhelpful behaviour. There were no associations between unhelpful behaviour and decrease in negative emotion in either group.

Other Problem Solving. There was no significant association between other problem solving and a decrease in child negative emotion in either group.

Cognitive Reappraisal. There was a small association between child cognitive reappraisal and a decrease in child negative emotion for the children with ASD (p = .04, V = .20). There was no similar effect for children without ASD.

Question Three Summary. The parent strategies that appeared to work in decreasing child negative emotion for TD children include emotional support and focusing on using other Lego to solve the problem. In the ASD group, the parent strategies that appeared to work included focusing on the stuck piece and cognitive reappraisal.

Research Question 4

Is parent behaviour during the discussion task associated with their perceptions of their child's anxiety and anger?

Table 29: Means of parent and child behaviour during the vignette task

Variable	ASD Mean (SD)	TD Mean (SD)
Anxiety P Elaboration	3.38 (4.31)	2.65 (2.18)
Anxiety P Scaffold	7.38 (4.24)	5.45 (2.91)
Anxiety P Strategy	2.71 (2.70)	1.75 (1.83)
Anxiety C strategy	3.90 (2.47)	4.65 (2.34)
Anger P Elaboration	1.95 (2.18)	1.55 (1.57)
Anger P Scaffold	9.28 (7.06)	5.60 (3.05)
Anger P Strategy	2.67 (2.50)	2.10 (2.02)
Anger C Strategy	3.61 (2.55)	4.55 (2.95)

Note. P = parent, C = child, these values do not account for total conversation turns, the regressions below account for total conversation turns

Associations with perceptions of anxiety. Negative Binomial regression was used to examine associations between parent report of child anxiety, diagnosis, and parent behaviour during the discussion task due to overly dispersed data. A specific parent behaviour (elaboration, scaffolding, strategy generation) was used as an outcome variable for each regression analysis. Diagnosis and SCAS-P total score were entered as predictors and IQ and age were entered as covariates, as appropriate. The offset variable included in each analysis was the total number of parent conversation turns. Unless stated below, 41 participants' data were used in the following analyses.

Predicting Elaboration. The omnibus test likelihood ratio χ^2 was 2.89 ($p = .41$). See Table 30 for more detailed information.

Predicting Scaffolding. Age and IQ were entered as covariates as they were correlated with parent scaffolding. The omnibus test was likelihood ratio χ^2 was 7.60 ($p = .18$). Please see complete data in Table 30.

Predicting Strategy Generation. The omnibus test likelihood ratio χ^2 equaled 3.09 ($p = .38$). Complete data are presented in Table 30.

Summary of anxiety. Overall, when examining parent behaviour and associations with parents' ratings of their child's anxiety, no effects were found.

Table 30: Regression—Associations between parent behaviour, diagnosis, and child anxiety

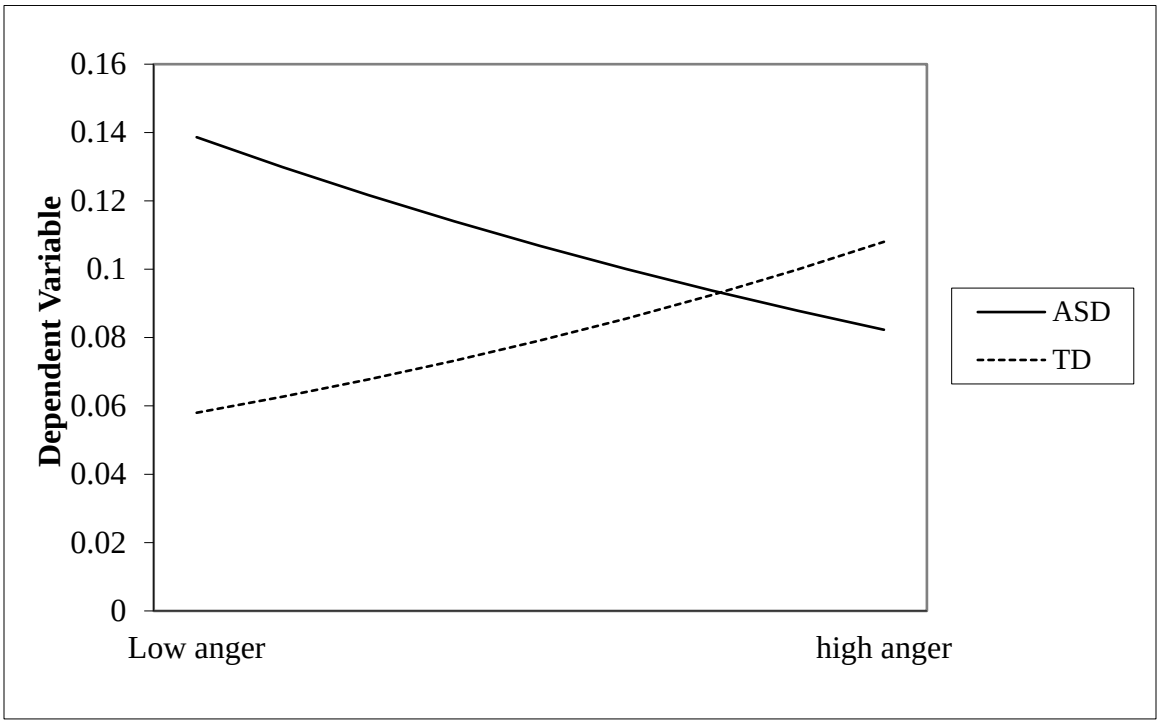
Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Elaboration	NB	1.12	-90.21	190.41	2.89 (3)	1.99*					
intercept							-4.65	2.21	.01	<.01-.72	4.45*
diagnosis							1.13	2.82	3.10	.01-778.64	.16
SCAS-P							.05	.04	1.05	.98-1.13	1.71
interaction							-.02	.05	.98	.89-1.01	.18
Scaffolding	NB	1.21	-107.62	232.64	7.60 (5)	1.99*					
intercept							-1.04	1.48	.352	.02-6.38	.50
age							.11	.05	1.11	1.00-1.24	3.68*
IQ							-.01	.01	.99	.98-1.01	.66
diagnosis							.02	1.38	1.02	.07-15.12	<.01
SCAS-P							-.01	.02	.99	.96-1.03	.13
interaction							-.01	.02	1.00	.95-1.04	.04
Strategy	NB	1.14	-80.59	171.18	3.09 (3)	2.81*					
intercept							-3.54	2.12	.03	0.00-1.86	2.78*
diagnosis							.13	2.84	1.14	<.01-294.23	<.01
SCAS-P							.03	.04	1.03	.96-1.10	.57
interaction							-.01	.05	.99	.90-1.09	.04

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Associations with perceptions of anger. To examine associations between diagnosis, parent-reported anger and parenting variables during the discussion task (scaffolding, elaboration, and strategy generation), Poisson or negative binomial regression was used. The offset variable was total number of parent conversation turns, and predictors were BASC-2 anger control scores and diagnosis. Age and IQ were added, as appropriate.

Predicting Elaboration. When predicting elaboration, the model was overly dispersed; however, a negative binomial model also did not fit the data. Therefore, a Poisson regression model using robust estimation of the covariance matrix was used. The omnibus hypothesis likelihood ratio χ^2 equaled 8.14 ($p = .04$). Parents of TD children were .03 times as likely to use elaboration (97% less than ASD group; Wald $\chi^2 = 5.27$, Exp(B) = .03, $p = .02$). This difference did not persist after accounting for parent ratings of child anxiety (difference contrast Wald $\chi^2 = .67$, $p = .41$). The interaction was plotted for interpretation (as recommended by Coxe, West, & Aiken, 2009) by using excel spreadsheets available from Jeremy Dawson http://www.jeremydawson.co.uk/slopes.htm). For children with ASD, parents were more likely to use elaboration when their children had less difficulty with anger control (i.e. less anger) compared to when their children had more difficulty with anger control (i.e. more anger). For the TD group, parents were more likely to use elaboration when they reported more concern with their child's anger compared to less concern with their child's anger. Please see Figure 1.

Figure 1: Interaction between diagnosis and SCAS-P scores when predicting elaboration



Note. Dependent Variable = Elaboration

Predicting Scaffolding. Child IQ was included as a covariate. The omnibus test likelihood ratio χ^2 equaled 8.05 (p = .09). As p values testing the significance of individual regression coefficients were greater than .1, no other interpretations were made. Please see Table 31 for more information.

Predicting parent strategy generation. The omnibus test likelihood ratio χ^2 equaled 1.22 (p = .75). Please see Table 31 for more information.

Table 31: Regression—Association between parent behaviour, diagnosis, and child anger

Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Elaboration	P	1.96	-74.10	156.20	8.14* (3)	1.81					
intercept							-.76	1.40	.47	.03-7.33	.29
diagnosis							-3.54	1.54	.03	<.01-.60	5.27*
BASC-Anger							-.03	.02	.97	.93-1.02	1.39
interaction							.06	.02	1.06	1.01-1.11	5.49*
Scaffolding	NB	1.05	-109.00	230.00	8.05* (4)	3.14*					
intercept							-1.72	1.19	.18	.02-1.85	2.09
IQ							-.002	.01	1.00	.98-1.01	.08
diagnosis							1.27	1.07	3.57	.44-29.27	1.41
BASC-Anger							.02	.01	1.02	.99-1.04	2.09
interaction							-.029	.02	1.02	.94-1.01	2.38
NB							.14	.06	.97		
Strategy	NB	1.01	-83.94	177.87	1.22 (3)	2.42*					
intercept							-2.74	1.58	.06	<.01-1.43	3.01*
diagnosis							-.01	2.11	.99	.02-61.88	<.01
BASC-Anger							.01	.03	1.01	.96-1.07	.26
Interaction							<-.01	.04	1.00	.92-1.07	.01
NB							.57	.25			

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Summary of anger. Overall, parents of children with ASD were less likely to use elaboration during the anger discussion task when their child had greater challenges with anger control compared to when their children had fewer challenges with anger control. For parents of TD children, the pattern was the opposite. These parents were less likely to use elaboration when their children were reported to have fewer challenges with their anger, and likely to use more elaboration when their child had greater challenges with anger.

Research Question 5

Is how parents elaborate on emotions associated with child emotion regulation (through behaviour observed in Lego task), and is this different than what is found in TD children?

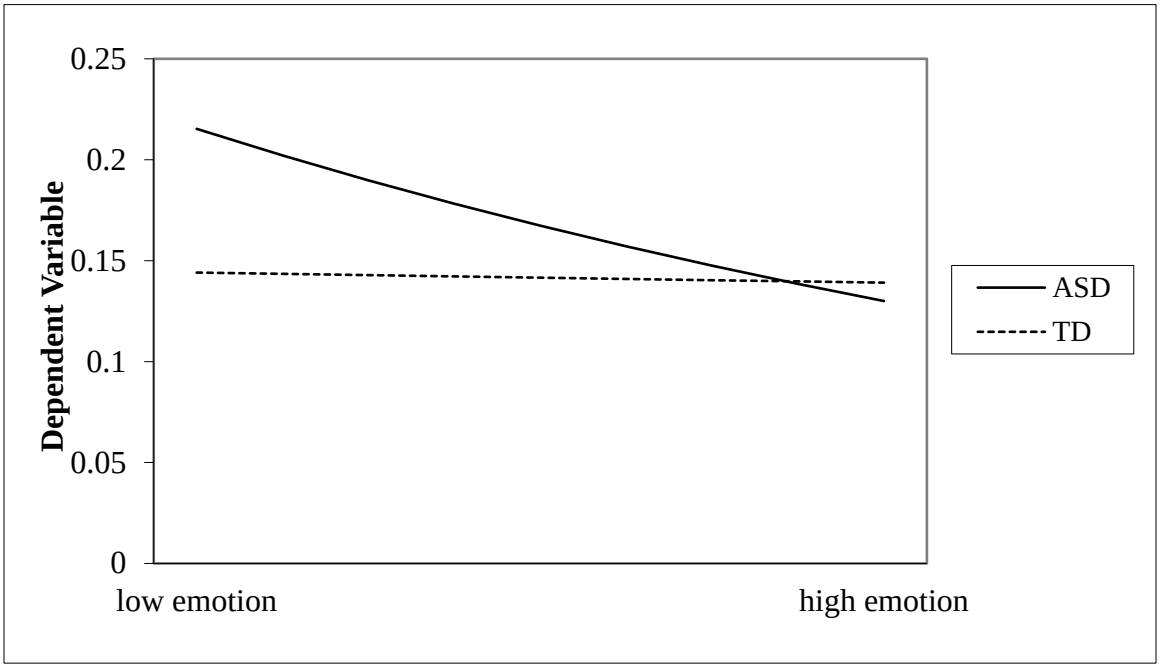
Predicting parent behaviour during the discussion task. Negative Binomial regression was used with specific parent behaviour as the outcome variable. Predictors included child emotion during the Lego task, diagnosis, and the interaction between the two variables. The child emotion variable was created by taking the highest level of negative emotion displayed in each interval and adding across intervals. Negative emotion was coded as three, neutral emotion was coded as two, and positive emotion was coded as one. The total was then divided by the number of intervals coded for that dyad. Unless specified below, data from all 40 participants who completed the Lego task are included in the results below.

Predicting anxiety elaboration. The omnibus test likelihood ratio χ^2 equaled 2.34 ($p = .51$). See Table 32 below for more information.

Predicting anxiety scaffolding. Two outliers were identified. Analyses were run with and without the outliers to examine influence. Since the results changed, both sets of results are reported below. When all participants were included in the analyses, the omnibus test likelihood ratio χ^2 equaled 11.11 ($p = .05$). For every one-year increase in age, parents were 1.16 times more likely to scaffold their children (Wald $\chi^2 = 6.72$; Exp(B) = 1.16, $p = .01$). Additionally, for every one-point increase of an instance of child negative emotion, parents were .24 times more likely to scaffold (decrease of 76%; (Wald $\chi^2 = 2.96$; Exp(B) = .24; $p = .09$). Please see Table 32 below.

When outliers were removed, results changed. The omnibus likelihood ratio χ^2 equaled 18.45 ($p < .01$). For every one-year increase in age, scaffolding increased 1.15 times (Wald $\chi^2 = 8.92$; Exp(B) = 1.15; $p < .01$). Parents of TD children were .008 times as likely to use scaffolding compared to parents of children with ASD (ASD group used 99% more; Wald $\chi^2 = 3.66$; Exp(B) = .01; $p = .06$). With every one-point increase in child negative emotion (i.e., more negative emotion), parents were .09 times as likely to use scaffolding (91% less; Wald $\chi^2 = 9.49$; Exp(B) = .09; $p < .01$). The interaction between diagnosis and decrease in child negative emotion is presented below (Wald $\chi^2 = 3.43$; Exp(B) = 9.60; $p = .06$). Please see Figure 2. Parents of TD children used similar amounts of scaffolding no matter what their child's negative emotion was during the Lego task. Parents of children with ASD, however, were less likely to use scaffolding as their children had more negative emotion.

Figure 2: Interaction between diagnosis and negative emotion when predicting scaffolding



Note. Dependent Variable = Parent scaffolding

Anxiety Summary. When discussing anxiety, parents of children with and without ASD were more likely to scaffold when their child was observed to display more negative emotion during the Lego task. As child negative emotion during the Lego task increased, parent scaffolding was more likely to decrease. An interaction between scaffolding and anxiety was also found where parents of the TD group used similar amounts of

elaboration regardless of their child's emotion. Parents in the ASD group used more scaffolding when their children had less negative emotion, and less scaffolding when their children were observed to have more negative emotion during the Lego task.

Table 32: Regression—Association between negative emotion, diagnosis, and parent behaviour

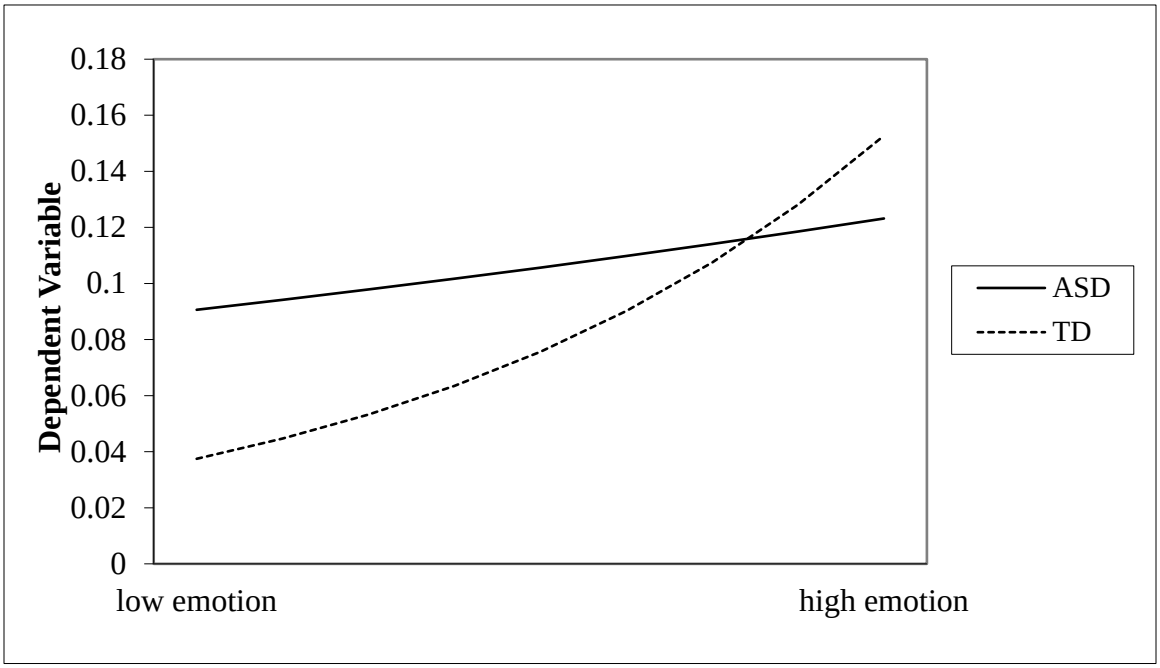
Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Elaboration	NB	.96	-88.63	187.27	2.34 (3)	2.61*					
intercept							1.88	4.06	6.55	.002-18827.20	.214
diagnosis							-9.17	6.83	<.01	1.60 e-10 – 67.77	1.80
emotion							-1.75	1.95	.17	.004-7.94	.81
interaction							4.27	3.27	71.58	.12-43048.959	1.71
NB							.80	.28			
Scaffolding	NB	1.32	-103.55	221.22	11.11* (5)	2.96*					
intercept							1.14	1.76	3.11	.10-98.29	.42
IQ							-.01	.01	.99	.98-1.01	.77
age							.15	.06	1.16	1.04-1.30	6.72*
diagnosis							-1.43	2.97	.24	.001-81.20	.23
emotion							-1.44	.84	.24	.05-1.22	2.96*
interaction							.61	1.42	1.84	.11-30.01	.18
NB							.13	.07			
Scaffolding (no outliers)	NB	1.40	-90.52	195.04	18.45* (5)	2.96*					
intercept							3.24	1.66	25.64	1.00-659.92	3.83*
IQ							-.01	.01	.992	.98-1.01	1.55
age							.14	.05	1.15	1.05-1.26	8.92*
diagnosis							-4.84	2.53	.008	5.49 e^{-5} – 1.13	3.66*
emotion							-2.43	.79	.09	.019-.413	9.49*
interaction							2.26	1.22	9.60	.88-105.12	3.43*
NB							.02	.046			

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Predicting anger elaboration. Two outliers were identified when predicting anger elaboration. When these two participants were removed from the analyses, the results changed considerably. Both sets of results are reported below. With the influential participants included, the omnibus test likelihood ratio χ^2 equaled 1.46 (p = .69). Please see Table 33 for more information.

After removing the influential participants, the omnibus test likelihood χ^2 now equaled 9.81 (p = .02). Parents of TD children were likely to use substantially less elaboration when compared to parents of children with ASD (100% less; Wald χ^2 = 4.01; Exp(B) = .000013; p = .05). This difference did not persist after accounting for negative emotion in the Lego task (Difference contrast Wald χ^2 = 1.79, p = .18). The interaction was plotted. Please see Figure 3 and Table 33. As evidenced by the plotted interaction, parents of children with and without ASD were more likely to use more elaboration during the anger vignette when child negative emotion during the Lego task was higher. However, the plotted interaction suggests that the slope is steeper for children without ASD. Overall, the higher a child's negative emotion, the more likely they were to have parents who used more emotional elaborations during the anger task.

Figure 3: Interaction between diagnosis and negative emotion when predicting elaboration



Note. Dependent Variable = Parent Elaboration

Predicting anger scaffolding. The omnibus test likelihood ratio χ^2 equaled 6.66 ($p = .16$). Please see Table 33 for full results.

Table 33: Regression—Association between parent behaviour, diagnosis, and negative emotion during the anger discussion task

Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Elaboration	P	2.16	-75.50	158.99	1.46 (3)	1.82					
intercept							-2.90	1.84	.06	.001-2.04	2.47
diagnosis							-.86	3.58	.42	<.01-468.48	.06
emotion							.29	.89	1.34	.24-7.59	.11
interaction							.28	1.70	1.33	.047-37.35	.03
Elaboration (no outliers)	P	1.78	-67.36	142.73	9.809* (3)	1.15					
intercept							-5.31	2.78	.005	2.15 e-5 – 1.14	3.66*
diagnosis							-11.29	5.64	1.26 e-5	2.00 e-10 - .79	4.01*
emotion							1.48	1.34	4.39	.32-61.20	1.21
interaction							5.29	2.69	198.55	1.02-38585.84	3.87*
Scaffolding	NB	1.06	-107.20	226.40	6.66 (4)	2.96*					
intercept							1.10	1.56	3.00	.14-64.08	.49
IQ							-.002	.01	1.00	.98-1.01	.75
diagnosis							-2.52	2.90	.08	<.01-23.61	.39
emotion							-.79	.70	.45	.12-1.78	.26
interaction							1.01	1.38	2.75	.18-41.35	.46
NB							.16	.07			

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Anger summary. With regards to the anger discussion task, parents in both groups were more likely to use elaboration when their children displayed more negative emotion in the Lego task compared to when their children displayed less negative emotion during the Lego task. No differences in scaffolding were found.

Research Question 6

Does the number of strategies a dyad generates during the vignette task correlate with how successful parent and child are in decreasing child distress during the Lego task, and does this differ between groups?

To answer Research Question Six, five different strategy variables were used: 1) parent strategy generation during anxiety task, 2) parent strategy generation during anger task, 3) child strategy generation during anxiety task, and 4) child strategy generation during anger task, and 5) overall dyad strategy generation across both discussion tasks. Each strategy variable was considered an outcome variable and separate analyses were completed for each outcome variable. The predictors for each regression equation included the number of times child negative emotion decreased during the Lego task, child diagnosis, and the interaction between the two variables. Poisson or negative binomial regression analyses were chosen depending on how the data were dispersed.

Predicting overall dyad strategies. The overall model likelihood ratio χ^2 was .57 ($p = .90$). Please see Table 34 for more information.

Predicting parent anxiety strategies. The overall likelihood ratio χ^2 was 2.77 ($p = .43$). Please see Table 34 for more information.

Predicting parent anger strategies. The overall likelihood ratio χ^2 was 2.27 ($p = .52$). Please see Table 34 for more information.

Predicting child anxiety strategies. Income was included as a covariate in the model. The overall model likelihood ratio χ^2 was 18.87 ($p = .01$). Results suggested that families in the $80-109, 000 income bracket had children that were likely to identify 50% less strategies compared to the comparison group (greater than $140, 000; Wald $\chi^2 = 5.16$, Exp (B) = .51, $p = .02$). Post-hoc pairwise comparisons were examined for income. Children of families in the $80-109,000 income bracket generated less anxiety strategies

than children in all other income brackets, except for the $20-49,999 bracket. No other differences or associations were found. Please see Table 34 and the Discussion chapter for more details.

Predicting child anger strategies. The overall likelihood ratio χ^2 was 5.34 ($p = .15$). Please see table 34 for more information.

Research Question Six Summary. Generally, number of intervals with a decrease in negative emotion in the Lego task, was not associated with strategy generation in the discussion tasks. The exception was anxiety where income was associated with child anxiety strategy generation in the discussion task. This finding will be discussed in sections below.

Table 34: Regression—Associations between emotion strategy generation, emotion change, and diagnosis

Variable	test	Pearson χ2/df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Dyad Strategies	NB	.94	-129.05	268.11	.57 (3)	4.24*					
intercept							-1.78	.15	.17	.13-.23	145.61*
diagnosis							.06	.21	1.06	.70-1.61	.09
decrease							-.36	1.53	.70	.04-14.09	.06
interaction							-.58	2.01	.56	.01-28.95	.08
NB							.17	.06			
Parent Strategies	NB	.99	-100.62	211.25	3.21 (3)	4.63*					
intercept							-2.09	.23	.12	.08-.20	82.42*
diagnosis							-.16	.34	.86	.44-1.67	.21
decrease							1.83	2.31	6.22	.07-571.30	.63
interaction							-3.30	3.27	.04	6.07 e-5- 22.24	1.02
NB							.42	.15			
Child Anxiety Strategies	P	1.23	-79.47	174.94	18.87* (7)	.62					
intercept							-1.42	.16	.24	.18-.34	74.55
income 1							-.48	.65	.63	.18-2.25	.50
income 2							.29	.24	1.33	.83-2.13	1.44
income 3							-.68	.30	.50	.28-.911	5.16*
income 4							.18	.21	1.20	.80-1.80	.77
diagnosis							-.04	.22	.96	.63-1.46	.04
decrease							-3.15	1.97	.04	.001-2.04	2.56
interaction							3.72	2.39	41.23	.38-4421.515	2.43
Child Anger Strategies	P	1.59	-87.82	183.63	5.34 (3)	.94					
intercept							-1.65	.15	.19	.14-.26	119.19*
diagnosis							.20	.20	1.22	.82-1.83	.97
decrease							-2.33	1.88	.10	.002-3.91	1.53
interaction							2.13	2.26	8.42	.10-702.21	.89

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Research Question 7

Is parent elaboration and scaffolding during the vignette task associated with child social competence, and is this different between groups?

Poisson or negative binomial regression models were created with predictors including diagnosis, either the MSCS total score or the ER score, and the interaction between diagnosis and MSCS score. The outcome variables were elaboration or scaffolding during either the anger or anxiety discussion. In total, eight sets of regression results are reported to answer this research question. Unless otherwise stated, the data from all 41 participants were used in the following analyses.

Predicting Anxiety Elaboration from MSCS total score. The omnibus likelihood ratio $\chi 2$ when using MSCS total score was 4.70 ($p = .20$). Please see Table 35 for more information.

Predicting Anxiety Elaboration from MSCS ER score. The omnibus likelihood ratio $\chi 2$ was .84 ($p = .84$). Please see Table 35 for more information.

Table 35: Model statistics—Associations between parent elaboration, social competence, and diagnosis

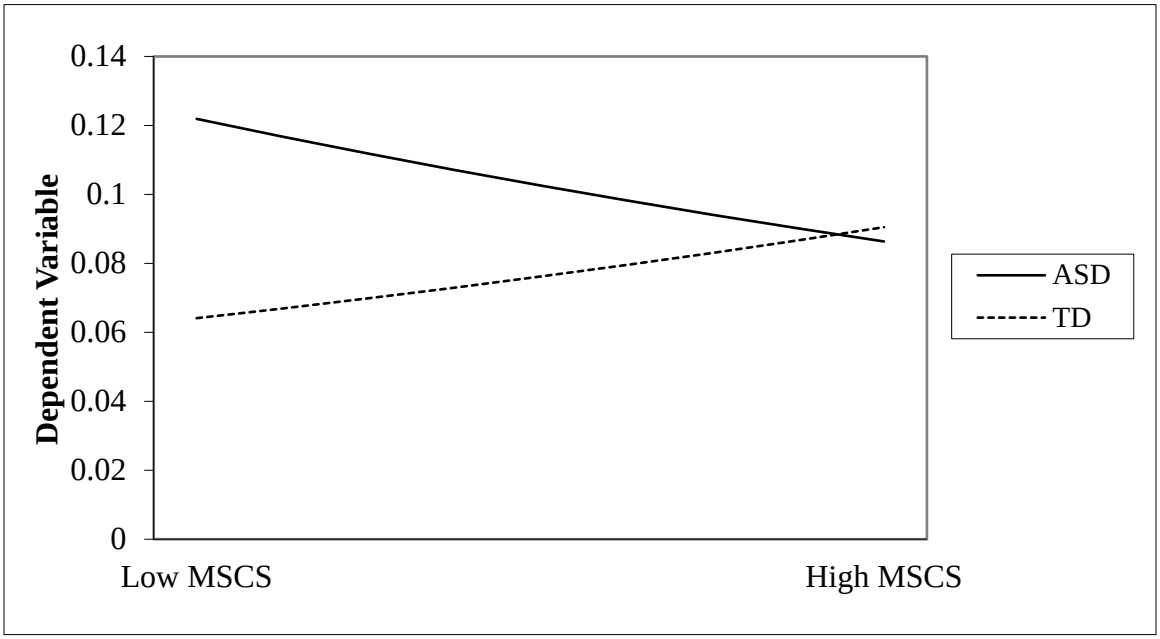
Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Anxiety Elaboration	NB	1.035	-89.30	188.61	4.70 (3)	2.06*					
intercept							1.47	1.71	4.35	.15-124.83	.74
diagnosis							-3.81	2.52	.02	<.01 – 3.08	2.29
MSCS **Total**							-.02	.01	.98	.97-1.00	3.76*
interaction							.02	.01	1.02	1.00-1.04	2.78*
NB							.67	.25			
Anxiety Elaboration	NB	.973	-91.23	192.46	.84 (3)	3.36*					
intercept							-2.10	.86	.12	.02-.66	5.98*
diagnosis							.60	1.39	1.81	.12-27.82	.18
MSCS **ER**							.01	.03	1.01	.96-1.07	.16
interaction							-.03	.04	.98	.90-1.06	.37
NB							.79	.28			

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Predicting anxiety scaffolding from MSCS Total score. Different patterns of results were observed when examining results with and without influential outliers. With all participants' data included, the omnibus test likelihood ratio χ^2 was 17.90 (p = .003). For every one-year increase in age, parents used 1.10 times more scaffolding during the anxiety task (Wald χ^2 = 5.30; Exp(B) = 1.10; p = .02).

When outliers were excluded the likelihood ratio χ^2 value continued to be 17.90 (p = .003); however, when examining individual variables in the regression model, Wald chi-squared statistics and p-values changed. Parents of TD children were .17 times as likely to use scaffolding during the anxiety task compared to parents of children with ASD (ASD group parents used 83% more; Wald χ^2 = 3.77; Exp(B) = .17; p = .05). The chi-squared value and exponentiated beta values for the interaction term (between diagnosis and MSCS) also changed (Wald χ^2 = 2.98, Exp (B) = 1.01, p = .08). When they rated their children to have higher MSCS total scores, parents in both groups used scaffolding a similar amount during the discussion. When MSCS total scores were lower, parents of TD children were less likely to use scaffolding and parents of children with ASD were more likely to use scaffolding. Please see Table 36 and Figure 4 for more information.

Figure 4: Interaction between diagnosis and MSCS total score when predicting scaffolding



Note. Dependent Variable = Parent Scaffolding

Predicting anxiety scaffolding from MSCS ER score. Some outlying data points were determined to have influence on the results. With all participants, the omnibus test was significant (Likelihood ratio $\chi^2 = 17.64$, $p < .01$). For every one-year increase in age, scaffolding increased by 1.09 times (Wald $\chi^2 = 5.26$, Exp (B) = 1.09). Please see Table 36 for more information.

When influential data points were removed from the analysis, Wald chi-squared and p-values changed. The new omnibus likelihood ratio χ^2 equaled 14.61 ($p = .01$). There continued to be a similar association between age and scaffolding (Wald $\chi^2 = 2.43$, Exp (B) = 1.07, $p = .12$). Parents of TD children were .33 times as likely to use scaffolding compared to parents of children with ASD (Parents of children with ASD 67% more likely to use scaffolding; Wald $\chi^2 = 2.97$, Exp (B) = .33; $p = .08$). See Table 36 for more details.

Table 36: Regression—Associations between scaffolding, MSCS, and diagnosis during the anxiety discussion

Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Scaffolding	P	2.30	-11.92	235.84	17.90* (5)	1.55					
intercept							-.89	.78	.41	.09-1.91	1.28
age							.09	.04	1.10	1.02-1.18	5.93*
IQ							-.01	.01	.99	.98-1.00	1.90
diagnosis							-1.49	.91	.23	.04-1.35	2.65
MSCS **Total**							-.001	.003	1.00	.99-1.00	.27
interaction							.005	.004	1.00	1.00-1.01	1.71
Scaffolding (no outliers)	P	2.32	-107.79	227.57	17.90* (5)	1.39					
intercept							-1.53	.86	.22	.04-1.17	3.16
age							.12	.04	1.13	1.04-1.22	8.51*
IQ							-.001	.01	1.00	.99-1.01	.03
diagnosis							-1.79	.92	.17	.03-1.02	3.77*
MSCS **Total**							-.003	.003	1.00	.99-1.00	1.38
interaction							.006	.004	1.01	1.00-1.01	2.98*
Scaffolding	P	2.27	-112.05	236.10	17.64* (5)	1.62					
intercept							-.79	.74	.45	.11-1.94	1.14
age							.09	.04	1.09	1.01-1.18	5.26*
IQ							-.01	.01	.99	.98-1.00	1.76
diagnosis							-.98	.60	.37	.11-1.22	2.64
MSCS **ER**							-.01	.01	.99	.96-1.1	1.08
interaction							.02	.02	1.02	.99-1.06	1.70
Scaffolding (no outliers)	P	2.10	-99.72	211.44	14.61* (5)	1.30					
intercept							-1.42	.87	.24	.04-1.33	2.67
age							.07	.04	1.07	.98-1.17	2.43
IQ							<.01	.01	1.00	.99-1.01	.002
diagnosis							-1.10	.64	.33	.10-1.16	2.97*
MSCS **ER**							-.01	.01	.99	.96-1.02	.42
interaction							.02	.02	1.02	.99-1.06	1.40

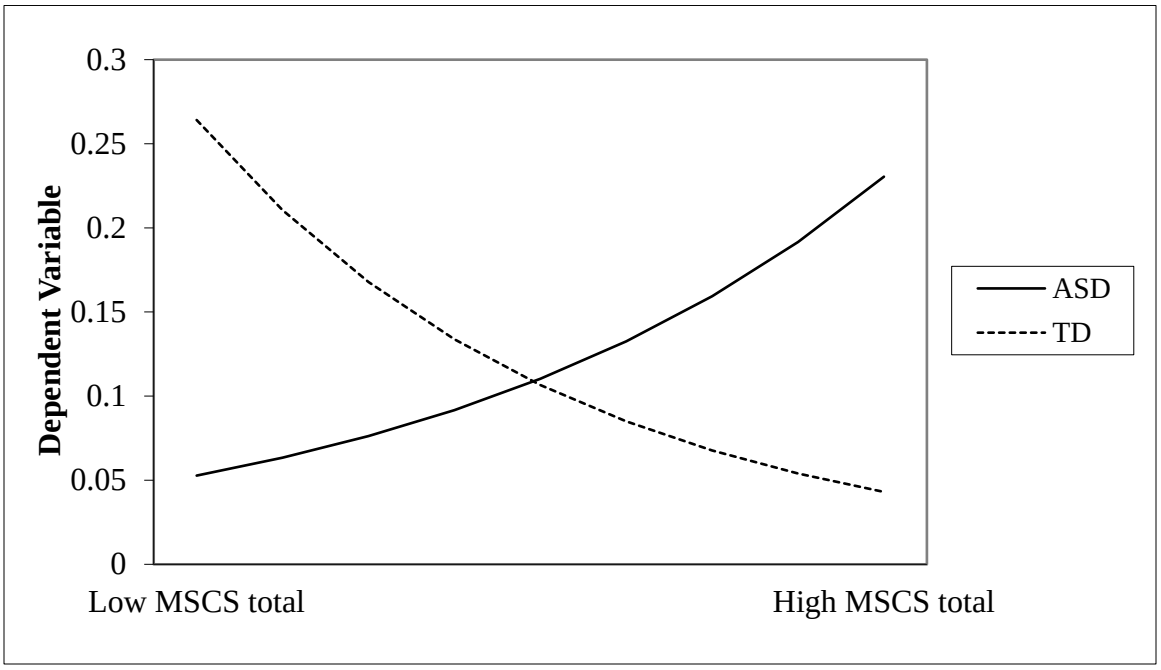
Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Predicting Anger Elaboration from MSCS total score. When the form of the relationship was inspected visually, it was noted that data points of five participants were separate from the rest and clustered together. These participants were also flagged for inspection as outliers when inspecting Studentized Pearson residuals. Given the combination of the visual inspection and the examination of residuals, analyses were run with and without this group of participants. When all the data were included, the omnibus likelihood ratio χ^2 equaled 5.57 (p = .14). Please see Table 37 for more information.

When the five outlying participants were removed from the data, results followed the same general pattern, however, the omnibus likelihood ratio χ^2 changed and was now 11.41 (p = .01). According to the plotted representation of the interaction (Wald χ^2 = 9.77, Exp (B) = .97, p = 002), when parents of TD children rated their children to have lower emotion regulation skills, they provided more emotional elaboration compared to when they rated their children to have higher/better emotional regulation skills. For the ASD group, better emotion regulation ratings were associated with more elaboration, and less elaboration was associated with lower ratings of emotion regulation. Please see Table 37 and Figure 5 for more information.

Given the large confidence intervals (see Table 37), Kendall's Tau b values were calculated between MSCS emotion regulation score and elaborations during the anger task for each group. A similar pattern was observed as the results from Poisson regression. In the TD group MSCS ratings and elaboration were negatively associated (T = -.28; p = 1.00). These variables had a positive association in the group of children with ASD (T = .36; p = .03).

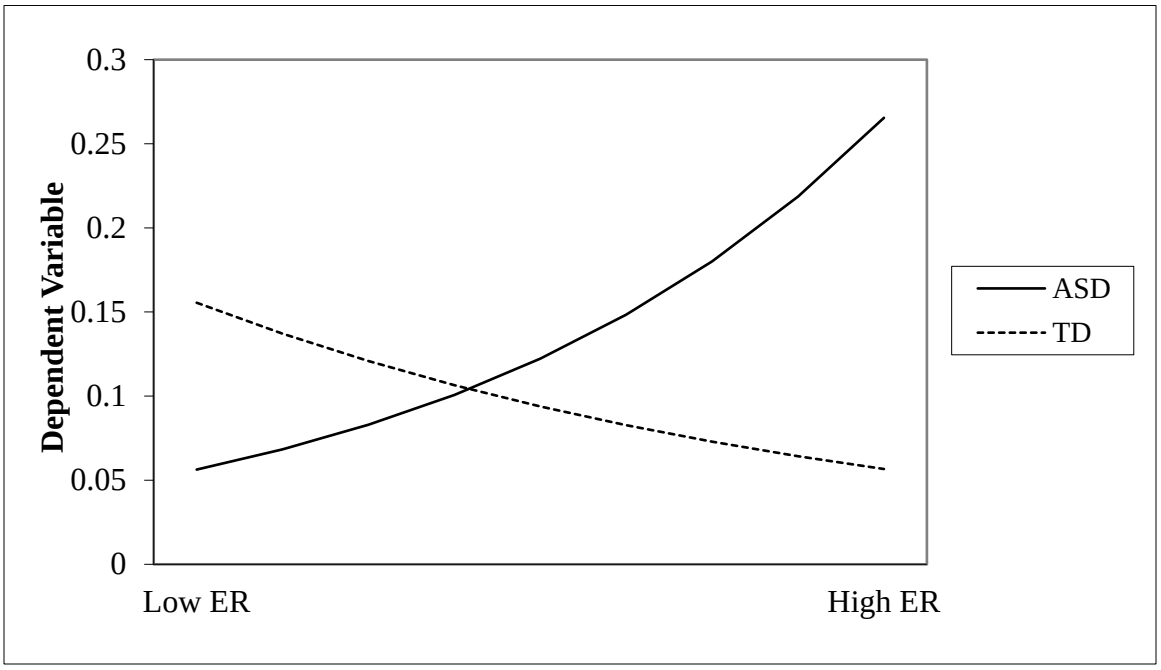
Figure 5: Interaction between diagnosis and MSCS total score when predicting elaboration



Note. Dependent Variable = Parent elaboration

Predicting Anger Elaboration from ER total score. The omnibus likelihood ratio chi-square = 22.13 ($p < .01$). Please see Table 37 and Figure 6 for details. For parents of TD children, parents used more emotional elaboration when their child had worse emotion regulation scores on the MSCS. For parents of children with ASD, the opposite effect was found. These parents used more elaboration when they rated their child as having better emotion regulation (interaction Wald $\chi^2 = 20.54$, Exp (B) = .87; $p < .01$).

Figure 6: Interaction between diagnosis and MSCS ER score when predicting elaboration



Note. Dependent Variable = Parent elaboration

Table 37: Regression—Associations between MSCS, elaboration, and diagnosis during the anger discussion

Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Elaboration	P	2.28	-75.39	158.77	5.57 (3)	1.31					
intercept							-3.38	1.00	.03	.01-2.4	11.33*
diagnosis							3.55	1.74	34.74	1.14-1059.70	4.14*
MSCS total							.005	.005	1.01	1.00-1.02	1.11
interaction							-.01	.01	.99	.97-1.00	4.36*
Elaboration	P	.82	-45.15	98.30	11.41* (3)	-1.76					
intercept							-5.45	1.50	.004	<.01-.08	13.19*
diagnosis							7.21	2.27	1346.46	15.86-114279.60	10.11*
MSCS total							.01	.01	1.01	1.00-1.03	3.44*
interaction							-.03	.01	.97	.95-.99	9.77*
Elaboration	P	1.50	-67.10	142.21	22.13* (3)	.96					
intercept							-4.49	.75	.01	.002-.03	43.85*
diagnosis							4.42	1.07	82.98	10.23-673.40	17.11*
MSCS ER							.09	.02	1.09	1.04-1.14	14.42*
interaction							-.14	.03	.87	.82-.92	20.54*

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Predicting Anger Scaffolding from MSCS total score. The overall model likelihood ratio chi-square was 7.77 (p = .10). Please see full details in Table 38.

Predicting Anger scaffolding from MSCS ER score. The likelihood ratio chi-square was 7.08 (p = .13). Please see Table 38 for more details.

Summary of Research Question Seven. Parents of children with ASD provided more scaffolding overall; however, they used similar amounts of scaffolding as did parents of TD children when their child was rated higher on the MSCS total scale. When examining parent behaviour during the anger discussion task, parents of children with ASD provided more emotional elaborations when their child was rated better on social competence, specifically emotion regulation, compared to when their child was rated lower. Parents of children without ASD elaborated more when their child had lower rated social competence and emotion regulation compared to when their child had better parent-rated social competence and better emotion regulation.

Table 38: Regression—Associations between scaffolding, diagnosis, and MSCS during the anger discussion task

Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Scaffolding	NB	1.07	-109.14	230.28	7.77 (4)	3.02*					
intercept							.38	.94	1.47	.23-9.17	.17
IQ							-.003	.01	1.00	.98-1.01	.12
diagnosis							-1.88	1.21	.15	.01-1.65	2.39
MSCS **Total**							-.01	.003	1.00	.99-1.00	2.08
interaction							.01	.005	1.00	1.00-1.02	1.91
NB							.14	.07			
Scaffolding	NB	1.07	-109.48	230.97	7.08 (4)	3.08*					
intercept							.06	.87	1.06	.19-5.79	.004
IQ							-.003	.01	1.00	.98-1.01	.139
diagnosis							-1.25	.78	.29	.06-1.33	2.55
MSCS **ER**							-.02	.02	.98	.95-1.01	1.49
interaction							.03	.02	1.03	.98-1.07	1.45
NB							.15	.07			

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Additional Analyses

Group differences in parent emotion. Negative binomial regression was used to examine mean group differences in parent positive and negative emotion with diagnosis as the predictor variable. The omnibus likelihood ratio χ^2 when examining positive emotion was 4.99 ($p = .03$). Wald $\chi^2 = 5.35$, $p = .02$). Parents of TD children were 2.28 times more likely to be observed using positive emotion compared to parents of children with ASD (Wald $\chi^2 = 5.35$, Exp(B) = 2.27, $p = .02$). Please see Table 39 for more information. When examining parent group differences in negative emotion, the omnibus likelihood ratio chi-square was .45 ($p = .50$). Full results are available in Table 39.

Table 39: Regression—Parent emotion

Variable	test	Pearson χ2 /df	LL	AIC	LR χ2 (df)	LM	B	SE	ExpB	95% CI	Wald χ2
Positive	NB	.94	-70.55	147.11	4.99* (1)	.08					
intercept							-2.30	.27	.10	.06-.17	71.32*
diagnosis							.82	.36	2.28	1.13-4.57	5.35*
NB							.62	.31			
Negative	NB	.99	-71.78	149.56	.45 (1)	1.87*					
intercept							-1.92	.22	.15	.10-.23	73.22*
diagnosis							.21	.31	1.23	.67-2.27	.46
NB							.41	.25			

Note. P = Poisson regression, NB = Negative Binomial regression, * p < .1, LL = Log Likelihood, LM = Lagrange Multiplier, AIC = Aikake's Information Criterion, LR χ^2 = Likelihood ratio chi-squared. B = unstandardized regression coefficient, SE = standard error of regression coefficient, ExpB = exponentiated regression coefficient.

Group differences in matched emotions. Poisson and negative binomial regression were determined to not fit the data and a Mann-Whitney U-Test was used to examine mean group differences in how often parents and children matched their positive and negative emotion within the same interval. Dyads in the TD group displayed positive emotion in the same interval more often than dyads in the ASD group (Mann-Whitney U statistic = 136.00, p = .09, r = .33). This was a small to medium effect. There was no meaningful effect for matched negative emotion (Mann-Whitney U statistic = 179.50, p = .58, r = .17).

Group differences in who has the stuck Lego piece. Mean group differences for who was unsticking the Lego pieces were assessed using Mann-Whitney U-tests as Poisson/Negative Binomial regression analyses were deemed inappropriate for the comparison due to the form of the relationship. On average, parents of TD children were more likely to be unsticking the Lego pieces in each 10 second interval compared to parents of children with ASD (Mann-Whitney U statistic = 132.50, p = .07, r = .29). Dyads in the ASD group were also more likely on average to not focus on the stuck piece compared to dyads with children without ASD (neither person actively unsticking the Lego piece during the coded interval; Mann-Whitney U statistic = 267.50.; p = .07; r = .30). There were no mean group differences in child focus on the stuck piece (Mann Whitney U statistic = 203.00, p = .95, r = .01) and both participants working on the stuck pieces at the same time (Mann Whitney U statistic = 177.00, p = .55, r = .11).

Discussion

In the current study, variables and aspects of parent emotion socialization previously identified as being important for typically developing children (e.g., the Tripartite Model; Morris et al., 2007) were studied in school-aged children with ASD. Specifically, emotion regulation in school-aged children with ASD was examined by using a parent-child play (Lego) task, parent-child discussion during a vignette task, and by comparing these two methods of researching emotion regulation. Parent behaviour such as emotional support, modelling, and emotion discussion was associated with emotion regulation in many ways (e.g., associations with emotion regulation scale, anger symptoms, anxiety symptoms). The current study also added to the extant literature by including a typically developing comparison group; this has not been available in previous studies with school-aged children with ASD.

Using the Lego Task

Previous research utilizing frustrating tasks often have instructions for parents to only provide as much help as they believe necessary (e.g., Fenning et al., 2018). In the current study, I examined child emotion regulation during a frustrating Lego task, where parents were instructed to be active participants in the task. This instruction allowed for an assessment of behaviour while parent and child were truly working together to achieve a common goal.

The Lego task was adapted from a study that examined emotion regulation in children with ADHD (Melnick & Hinshaw, 2000). When used with a sample of children with and without ASD, several behaviours were observed, including a variety of problem-solving strategies used by parents and their children. Positive and negative expressions of emotion were also observed. The Lego task appears to be a task suitable for future research examining parent-child interactions in children with ASD. Some helpful adjustments are described below.

Using Vignettes for Discussion

The discussion task required parent-child dyads to discuss two vignettes used in previous research with children with ASD (e.g., Beaumont & Sofronoff, 2008; Ting & Weiss, 2017). Prior to the current study, these vignettes had only been used with children and not their parents. During the course of these tasks, observed parent and child behaviours included generation of emotion regulation strategies, discussion of emotions, and parent guidance or scaffolding through the task. These observations suggest that using the vignettes in a parent-child discussion elicit behaviour of interest to emotion regulation and parenting researchers.

Group differences in parent behaviour during the Lego task (Research Question One)

It was predicted that parents of children with ASD would provide more support, engage in more problem solving, and provide less cognitive reappraisal than parents of children without ASD. Contrary to this hypothesis, the current findings suggest no group differences when examining coded parent behaviour during the Lego task.

There are other studies that did not find mean group differences in parent behaviour during parent-child co-regulation tasks (Hirschler-Guttenberg, Feldman, et al., 2015; B. J. Wilson, Berg, Zurawski, & King, 2013); however, one study found group differences. Hirschler-Guttenberg, Golan and colleagues found that parents of preschool children with ASD used simpler strategies compared to parents of verbal mental age matched TD children when completing a task that elicited emotion regulation with their children (Hirschler-Guttenberg, Golan, et al., 2015), and parents of children with ASD self-reported more supportive reactions to their children's anger compared to parents of TD children (Bougher-Muckian et al., 2015). The current study is the first to examine mean group differences in emotion-related parenting behaviour between school-aged children with and without ASD.

Overall, within the context of the current Lego task, the results of the current study suggest that parents of school-aged children with and without ASD do not meaningfully differ in the mean number of strategies when helping their children through a frustrating task.

Group differences in child behaviour and positive emotion expression during the Lego task (Research Question Two)

Hypotheses for research question two were partially supported. It was predicted that children with ASD would demonstrate more negative emotion, more maladaptive or avoidant coping strategies, and less problem-solving strategies on average compared to children without ASD.

During the Lego task, TD children used the provided instructions more often when compared to children with ASD. This finding extends previous research that reported preschool children without ASD used more constructive coping strategies than children with ASD (Jahromi et al., 2012).

There were no mean group differences when examining child negative emotion expression. Children in the TD group, however, were more likely to display positive emotion expressions compared to children without ASD.

When all participants were included, there were no group differences in child venting during the Lego task. After removing two outliers, TD children displayed more instances of venting compared to children with ASD. This finding is contrary to the current study hypotheses and previous research findings (e.g., Jahromi et al., 2012). The two participants removed from analyses were both in the ASD group and both displayed the highest instances of venting in the whole sample. It is possible that these two participants represent a subgroup of children this age that continues to use venting as a regulation strategy in middle childhood. Once removed from the sample, the finding that TD children used more venting than children with ASD combined with higher levels of positive emotion suggests that TD children may show more variety in their emotional expression. It is also possible that some children with ASD do use less venting (restricted affect/emotion/regulation) while others use more venting compared to typically developing peers (dysregulated affect/emotion/regulation). Further research is needed to investigate this finding and understand venting in school-aged children with ASD. Understanding its use in children may be more complicated than simply examining mean group differences.

Overall, results related to Research Question Two support previous findings from younger samples that TD children may be displaying both more positive emotion and a

wider variety of emotional expressions than children with ASD (e.g., Hirschler-Guttenberg, Golan, et al., 2015).

Within task associations between parent behaviour and child emotion expression (Research Question Three)

Hypotheses for Research Question Three were also partially supported. It was predicted that in TD children, observations of supportive parenting, comfort, and structure would be associated with a decrease in negative emotion in the next 10 second interval during the Lego task. It was also predicted that these strategies would not be as helpful for children with ASD.

When examining whether parent behaviour in one ten-second interval was associated with a decrease in child negative emotion intensity in the next interval, the current study found that focusing on an alternative strategy (using other Lego) and providing emotional support for their child were helpful strategies for TD children, but not for children with ASD. In contrast, parent focus on the stuck piece and parent cognitive reappraisal of the situation were helpful strategies for children with ASD, and not TD children. No other coded parent behaviours were associated with a decrease in child negative emotion intensity. Notably, the strategies that were effective for the children with ASD, were those that focused on the stuck pieces (persisting and reframing) while the strategies that were effective for TD children were about the child (emotional support) and about stepping away from the problem (using alternate pieces rather than persisting).

The results of the current study partially fit with Morris et al. (2011) who found that cognitive reappraisal is associated with a decrease in child emotion in a sample of children aged four to nine. Although their study examined children without ASD, it is possible that cognitive reappraisal continues to be a helpful strategy into middle childhood for children with ASD, even if it is not for typically developing children. For children without ASD, cognitive reappraisal may not be a helpful strategy to reduce negative emotion and continue with the task; other strategies such as finding an alternative strategy might be more helpful to them.

These results suggest that despite there being no mean group differences in parent behaviour (Research Question One) in the current sample, these behaviours have

different associations with child emotion for children with and without ASD. Although further research is needed, different parenting strategies were helpful for each group of children suggesting that emotion-related parenting interventions need to be tailored to the specific needs of the children with ASD.

Associations between child characteristics and parent behaviour in the discussion task (Research Question Four)

Results partially supported hypotheses for Research Question Four. It was predicted that more elaboration and scaffolding would be associated with less parent-rated anxiety and anger.

Anxiety. Contrary to expectations, parent elaboration, strategy generation, and scaffolding during the anxiety discussion task were not associated with diagnosis or parent's ratings of their child's anxiety. There were, however, significant associations with anger.

Anger. Within the anger discussion task, only parent elaborations of emotions were associated with parent ratings of their child's anger on the BASC-2. Associations between anger rating and parent scaffolding or strategy generation were not found. For the ASD group, more parent elaboration was associated with better anger control (and, by implication, less elaboration was associated with worse anger control or a higher anger score on the BASC-2). For TD children, the opposite pattern was observed, more elaboration was associated with worse anger control (higher anger score).

In general, this pattern of findings is consistent with research showing that emotion-related parenting behaviour is associated with less externalizing or less maladaptive behaviour in children with ASD (Valentovich, Goldberg, Garfin, & Guo, 2018; B. J. Wilson et al., 2013). In previous research specifically examining school-aged children with ASD, parent scaffolding during conversations about anxiety and anger was found to be negatively associated with child externalizing behaviour but not child internalizing behaviour (Ting & Weiss, 2017), where higher quality scaffolding was associated with less concern about externalizing problems on the BASC-2. The current study found a similar pattern for parent elaboration, but not for scaffolding. In the current study, discussion of emotions (elaboration) versus discussion of emotion regulation strategies

(scaffolding or strategy generation) were separated. Previous studies (e.g., Ting & Weiss, 2017) use Gulsrud et al (2010)'s definition of scaffolding, which has important differences from the coding system used in the current study. It consists of 1) motivational scaffolding (keeping child on task, praise and encouragement), and 2) emotional scaffolding (making the task positive for the child and being sensitive to the child's emotions). It is also used as an overall rating for a specific interval of time, whereas the current study examined transcripts and individual conversation turns for presence of scaffolding and elaborations. Although all studies examining this topic define parent behaviour differently, the overall pattern appears to be that for children with ASD, more helpful or positive parenting behaviour (scaffolding, coaching, elaboration, explaining, praise, reflection) related to emotion expression is associated with less problem behaviour for children with ASD, especially in the externalizing domain.

Another possibility is that the current task (discussing a character's emotions) is not effective in influencing emotion regulation of school-aged TD children. Previous research examined emotion-related parent behaviour in a school-aged child sample using discussion tasks where the focus is on previous times when the child has felt a certain way, or on conflicts between the parent and child (e.g., Morelen et al., 2014; Morelen & Suveg, 2012; Ting & Weiss, 2017). For TD children, it may be that discussion of personal experience has stronger associations with child anger, anxiety, and social competence than vignettes. The vignettes used in the current study may be more appropriate for children with ASD.

Overall, the findings of the current study for parents and their children with ASD support previous research that has found that positive parent emotion-related behaviour is associated with lower externalizing or maladaptive child behaviours. Consistent with previous findings, parent behaviour during a discussion of the child's own emotions or that of another person is associated with externalizing behaviour in children with ASD (Ting & Weiss, 2017).

Associations between observed child emotional expressions and parenting during a different task (Research Question Five)

Hypotheses for Research Question Five predicted that more parent elaboration during the vignette task would be associated with less overall child negative affect during a frustrating task. It was also predicted that this association would be stronger for children with ASD. Hypotheses for research question five were partially supported.

Anxiety. Within the anxiety task, when parents of children with ASD used more scaffolding, their children displayed less negative emotion during the Lego task. Parents of TD children used the same amount of scaffolding regardless of their child's negative emotion during the Lego task. There were no associations with elaboration during the anxiety task. The results for the ASD group were in the expected direction for scaffolding during the anxiety discussion task. As with Research Question Four, more helpful emotion-related parenting behaviour is associated with better emotion related outcomes for children.

Anger. Within the anger task, both sets of parents used more elaboration when their children displayed more negative emotion during the Lego task and less elaboration when their children displayed less negative emotion during the Lego task. When examining the interaction graphically, the slope was steeper for parents of children without ASD as their children displayed more negative emotion. There were no associations with scaffolding during the anger discussion task.

These results are contrary to the results of the previous research question and underscore the importance of examining participant characteristics using a multimethod approach and examining different emotions. Results of Research Question 4 suggest that parents used more elaboration when they rated their children to display less negative emotion (as indexed by the BASC-2 anger scale). The results of question four and seven suggest that when parents of children with ASD engage in more helpful parenting behaviour, they rate their child to have less challenges with anger, anxiety, and social competence. However, direct observations of the child suggest that more helpful parenting is actually associated with more negative emotion. This will be discussed further in subsequent sections.

Associations between two methods of assessing emotion regulation (Research Question Six)

The aim of this research question was to examine associations between emotion regulation during a discussion task and emotion regulation during an interactive task. No hypotheses were made as the purpose of this question was to explore how different tasks purporting to assess a similar construct may or may not be statistically related. Overall, no associations were found between parent and dyad strategy generation during the discussion tasks and decreases in negative emotion intensity during the Lego.

There was, however, a small association between family income and child strategy generation during the anxiety discussion task. Children were more likely to generate fewer strategies if their family income was reported to be in the $80-109,999 range, compared to those in the $20-49, 999 income bracket. Previous research has not examined the role of socioeconomic status on emotion regulation in children with ASD. The current results do not demonstrate a clear association with income (patterns as income increases or decreases across all categories), and it is possible this finding is spurious, or the result of a small sample size.

The results of question six also highlight the importance of examining characteristics using a multimethod approach, clarifying how two or more methods of assessment may be similar or different, and expanding the tools we use in research to examine emotion regulation in children with ASD. In addition to parent-report, many published studies examining emotion regulation in school-aged children use the two vignettes used in the current study (e.g. Beaumont & Sofronoff, 2008), where children are asked to generate as many emotion regulation strategies as possible. Previous research finds only small to medium correlations between parent report of externalizing and internalizing problems with child-only vignette tasks (Ting & Weiss, 2017). More research examining emotion regulation through multiple methods of assessment may help to understand if or how discussing emotions with parents and having knowledge of emotion regulation strategies translates to real-life emotion regulation.

Associations between social competence/emotion regulation and parent behaviour during emotion discussion (Research Question Seven)

Hypotheses for Research Question Seven were also partially supported. Predictions included a positive association between parenting and social competence, with a stronger association for the ASD group. There was a consistent pattern for the prediction of elaboration during the anger discussion task.

Anxiety. During the anxiety discussion task, more scaffolding was associated with better total social competence for TD children. For children with ASD, parents used less scaffolding during the anxiety task when their children were rated to have better social competence. No associations with elaboration were found.

Anger. Parents who elaborated more were more likely to rate their children with ASD as having both better overall social competence and better emotion regulation. The opposite pattern was observed for TD children where parents elaborated more when their children were rated to have lower social competence and emotion regulation skills. Scaffolding during the anger discussion task was not associated with child social competence or emotion regulation.

This finding extends previous research that found that more parent elaborations of emotions were associated with better developed theory of mind in preschool children with ASD (Slaughter et al., 2007). The association between parent elaborations and aspects of social competence appears to extend to school-aged children with ASD.

Additional Group Differences

Additional group differences in parent emotion, matched emotion, and who is actively unsticking the Lego were explored.

Emotion. Similar to group differences in child emotion, it was found that parents of TD children were more likely to display positive emotional expressions with their children compared to parents of children without ASD. In a similar vein, both members of TD group dyads displayed positive emotion in the same interval compared to the ASD group. Similar patterns and associations were not found for negative emotions. Overall,

it appears that parents and children without ASD are more positive during interactions compared to parents and their children with ASD.

Parents and stuck piece. When examining who had the stuck piece and was working on it the most through the 10 second intervals, parents of TD children were more likely to focus on the stuck piece compared to parents of children with ASD. It is possible that parents of TD children were working on the stuck piece while their children engaged in other problem-solving strategies. It may be the case that parents of children with ASD did not focus on the stuck piece because they needed to support their child in other problem-solving strategies. This was not captured by the current coding system, and it may be helpful for future research to capture both individual behaviour as well as the function it may serve (e.g., supporting the child with looking at the instructions vs also looking at the instructions themselves).

No stuck piece. Dyads in the ASD group were also more likely than dyads in the TD group to not actively be working on the stuck piece (i.e., neither person was working on it). Again, it may be that in the ASD group, parents and children focused on other strategies at the same time, rather than use a divide and conquer approach.

Different patterns in predicting parenting behaviour depending on emotion and group. Which parent behaviour is associated with which child characteristics?

Anxiety. When examining parenting behaviour during the anxiety discussion, parent elaborations or generation of strategies during the anxiety task were generally not associated with diagnosis or parent ratings of child behaviour. Scaffolding, however, was associated with MSCS total score (parent report) and negative emotion observed during the Lego task (observation). A different pattern of results was associated with each method of assessing child behaviour. For children with ASD, more parent scaffolding was associated with lower scores in social competence; however, more parent scaffolding was associated with lower levels of negative emotion during the Lego task. The same behaviour by parents can be differently associated with child characteristics, even those characteristics that are similar.

Anger. When examining parent behaviour during the anger discussion, it was parent elaboration that was associated with a variety of parent-rated child behaviour including total social competence, emotion regulation, and anger. In the ASD group, more elaboration was associated with better ratings of social competence, anger, and emotion regulation. In contrast, when child behaviour was observed, more elaborations by parents were associated with more negative emotion for children with and without ASD. This pattern of findings suggests that parent perception of child behaviour was associated with parent behavior; however, parent perception did not match direct observations of the child. Please see Table 40 for a summary of these results.

Table 40: Summary of research questions 4-7

	Anxiety			Anger		
Child characteristics	**Elaboration**	**Scaffolding**	**Strategy**	**Elaboration**	**Scaffolding**	**Strategy**
Anxiety (SCAS-P) TD ASD	no interaction	no interaction	no interaction	n/a	n/a	n/a
Anger (BASC-2) TD ASD	n/a	n/a	n/a	↑Elaboration ↑Anger Problems ↑Elaboration ↓Anger Problems	no interaction	no interaction
Negative Emotion (Lego) TD ASD	no interaction	no change ↑Scaffolding ↓Negative Emotion	n/a	↑Elaboration ↑Negative Emotion ↑Elaboration ↑Negative Emotion	no interaction	n/a
Decrease in Emotion (Lego) TD ASD	n/a	n/a	no interaction	n/a	n/a	no interaction
ER (MSCS) TD ASD	no interaction	no interaction	n/a	↑Elaboration ↑ER Problems ↑Elaboration ↓ER Problems	no interaction	n/a
MSCS Total Score TD ASD	no interaction	↑Scaffolding ↓SC Problems ↑Scaffolding ↑SC Problems	n/a	↑Elaboration ↑SC Problems ↑Elaboration ↓SC Problems	no interaction	n/a

Note. SCAS-P = Spence Child Anxiety Scale-Parent Version, BASC-2 = Behaviour Assessment System for Children-2nd edition, ER = Emotion Regulation, MSCS = Multidimensional Social Competence Scale, SC = Social Competence.

These results are consistent with previous research which found that different emotions might be differentially associated with parenting behaviours. For example mothers were found to facilitate more regulation during an anger task compared to an anxiety task. (Hirschler-Guttenberg, Feldman, et al., 2015). The current study found more associations between parenting behavior and anger or general emotion regulation rather than anxiety specifically. There are several possibilities for the different patterns of results when examining parent behaviour during the anger versus anxiety discussions in the current study. One possibility is that discussion of anger is an important correlate of a child's own anger-related behaviour, but that discussion of anxiety has weaker associations. It is also possible that associations between parent behaviour during the anxiety discussion and child behaviour exist, but the association is not a strong one. A larger sample might be necessary to detect smaller effects. Future research may further explore these possibilities.

Characteristics of the current sample

Ethnicity. The current sample of children was approximately 50% of a mixed or minority ethnicity. This diversity in a sample is not common for ASD research. This ethnic composition reflects the changing demographic of the Vancouver area and highlights that children with ASD who may present for evidence-based services might be from a background that is not represented in the evidence-base. Some research suggests that parents of children with ASD who are from ethnic minorities are more likely to use parenting strategies such as distraction and redirection compared to White parents (Laurent & Gorman, 2018). The rest of the research reviewed, however, consists of mostly White samples. Given the sample size of the current dissertation, ethnicity-based comparisons of behaviour could not be made. It will be important for future research studies to consider including more ethnically diverse samples as well as a consideration of whether parenting/child rearing beliefs are influenced by their ethnic background in order to determine any influence a parent's culture may have on how they interact with their child. This in turn may influence what sorts of interventions a family needs when treating their emotion-related concerns. Although the current sample was quite diverse in comparison to most previous research, study findings likely still do not generalize to individuals from the backgrounds represented in the study due to low sample size/lack of

group effects, and they do not generalize to those who live in rural communities or are immigrants. Further research with larger proportions of ethnic minorities is required.

Gender. In previous research, girls are underrepresented and often make up zero to 20% of the sample (Pouw, Rieffe, Stockmann, et al., 2013; Rieffe et al., 2011; Samson et al., 2014). In the current study, the ratio of girls in the ASD group was consistent with gender ratios commonly identified in research (4:1). With this ratio, however, gender-based comparisons could not be addressed, due to the small sample of girls with ASD.

Mental health. Individuals with ASD are often diagnosed with co-occurring mental health problems because challenges with emotion regulation are inherent to the diagnosis (e.g., Mazefsky et al., 2013). Parents of children with ASD in this study rated their children to have more anxiety than parents of TD children. It is possible that a different pattern of group differences and associations might exist if children without ASD were also rated to have similar levels of anxiety, or children with ASD were rated to have lower levels of anxiety. Typically developing children with anxiety often demonstrate less positive affect with their parents compared to children with no anxiety (Suveg et al., 2008) More research including a larger variety of primary and co-occurring diagnoses may be helpful to identify both similarities and differences between groups where emotion regulation is hypothesized or known to play a role.

IQ. Children in both groups were verbal and had mean IQ scores above 70. When examining associations between IQ and variables of interest, there were small correlations between IQ and several parenting variables and child characteristics. When IQ was added into the regression equation, it was not often associated with a higher likelihood of increase in parenting variables of interest, suggesting that parenting is not associated with IQ in children with IQ scores above 70.

Income. Membership in income brackets were unequal between groups. Further investigation revealed that family income had some associations with the generation of strategies by the child during the anxiety discussion task. Given the small sample size, it is unclear whether this is a true effect or a byproduct of the small group of families in the study. It is also interesting that it was one bracket that was associated with less generation of strategies ($80-109,999), rather than the two income brackets at the

extreme ends of the spectrum. Future research will be needed to clarify any link between income and child emotion regulation.

Potential clinical implications

The current study provides some support for the use of parent-mediated interventions with a focus on emotional development (e.g., Tuning into Kids; K. R. Wilson et al., 2012). The results of past research combined with the current study suggest that discussing emotions is associated with externalizing behaviour for children with ASD (Fenning et al., 2018; Ting & Weiss, 2017). As more research is conducted and results continue to show the same patterns, the research could begin to be applied to parenting interventions specifically for parents of children with ASD, or adaptations of parenting interventions aimed at children without ASD.

Many mental health interventions for school-aged children with and without ASD include a parenting component or supplement (e.g., Facing Your Fears, Reaven, Blakeley-Smith, Hepburn, & Nichols, 2011; Coping Cat Parent Companion, (Kendall, Podell, Gosch, & Behr, 2010). Parents are often taught skills to help coach their child through negative emotions, challenge negative cognitions, and help their children work through their fears. Gaining a better understanding of parenting behaviour through future research will help refine which specific skills need to be taught to specific parents. School-aged children with ASD will also have received Applied Behaviour Analysis (ABA) based therapy when they were younger. Future creation of emotion socialization interventions for parents of these children might help to develop emotion skills after completing ABA based therapies have focused on cognition, language development, and adaptive behaviour.

Study Limitations & Future Considerations

The results of the current study must be interpreted with consideration of the limitations. Studies examining parent-child interactions in children with and without ASD often have similar sample sizes (e.g., Baker, Messinger, Lyons, & Grantz, 2010; Freeman & Kasari, 2013), or slightly larger samples sizes (Hirschler-Guttenberg, Feldman, et al., 2015; Hirschler-Guttenberg, Golan, et al., 2015). The small samples prevalent in the published

literature restrict the amount of power in analyses to detect effects and limit the ability to examine subgroups within children with and without ASD.

Smaller sample sizes are also more affected by individual data points. Within the sample, though results were generally in the same direction with or without inclusion of influential data points, removing one or two participants from the analyses often changed results. It is possible that these influential outliers would either not have been outliers if the sample size was larger, or that their influence on the data may indicate the presence of subgroups within the groups. More influential participants were in the ASD group and might represent some of the variability in behaviour that we see in children with and those without ASD. Upon further inspection, these children with ASD were rated higher on behavioural problems compared to children with ASD not identified as outliers and TD children who were identified as outliers. Future research with larger sample sizes will help to clarify some initial patterns found in the current study (e.g., collect a group of children with externalizing problems).

The coding used might also influence results. Given the large variety of methods used to assess emotion regulation in young children, the variety of operational definitions used when examining associations between parent and child, and the different patterns of results observed thus far, the topic of emotion regulation in parent-child interactions may benefit from qualitative coding and identification of themes on which future research can build upon and from which researchers may create common language and operational definitions. In the current study, coding systems and operational definitions from previous research were used; however, once coding began it was clear that many of these definitions were not applicable or appropriate for older children with ASD. Part of the reason may be that the coding systems available are generally used with younger children without ASD. Other research finds similar challenges (Ting & Weiss, 2017). More research and qualitative analyses are needed in order to create research tools and coding systems more appropriate to emotion regulation in older children with ASD.

Using an interval coding system balanced time needed to code interactions with the amount of information gleaned from the data. The current findings need to be interpreted in the context of behaviour occurring at least once per interval, rather than the total number of times a behaviour occurred or an average. Other methods of coding may provide different information. As past published research with school-aged children with

ASD has not often used an interactive play task, new coding categories were created to capture all commonly observed behaviours. In the future it may be helpful to use a coding system that focuses on a much smaller number of variables and whether the behaviour is self or other focused in the interaction.

The Lego task did not elicit many behaviours hypothesized to be present (Jahromi et al's coding system); however, it did elicit behaviour related to different types of problem solving (e.g., using instructions, persisting on the stuck piece, using other pieces). Future research may benefit from either a longer or more difficult task to elicit more negative emotion and a wider variety of emotion regulation strategies and related behaviour. It may also be helpful to use a novel task that includes a problem with which children may not already be familiar. Lego pieces stuck together is a common everyday problem that does happen when playing with the blocks and most children in the study had played with Lego before. A novel task might change the types and quantities of behaviour observed. It will be interesting to compare differences in behaviour within dyads for both parent and child to better understand how situational differences (novel versus familiar task) can affect behaviour.

Other aspects of emotion-related parenting may also be studied in future research. For example, it may be helpful to examine how attachment is associated with parent and child behaviour during discussion tasks or frustration tasks. It may also be interesting to examine how parents report on their own emotion-related behaviour and compare it to how they actually behave during emotion eliciting tasks.

Families who participated in the current research study were mostly recruited from the ADDL's mailing list. These are families that have participated in previous studies and have given the lab permission to contact them for future research. Many of the families also came from a mid to upper SES background. The results of the current study may not be generalizable to families not likely to volunteer for a university-based research study and of a lower SES. Initial analyses revealed mean group differences in child strategy generation during the anxiety discussion task and support seeking based on SES. It is possible that the initial findings were a result of multiple analyses, or that the follow-up analyses did not have enough power to detect associations. Further research examining the role of SES in child emotion regulation is needed.

Conclusion

The current study extended the literature by including a typically developing school-aged comparison group, and by examining parent and child emotion-related behaviour using two different methods (interactive play and discussion) used in previous studies. This study is one of a small handful to examine parent-child interactions in relation to child emotion in school-aged children with ASD. Though many group differences in parent and child behaviour were not found, many interaction effects were present in the data. The results of the study suggested that parents of children with ASD provide emotion elaboration and scaffolding for their children when discussing emotions. Elaborations of anger, in particular, are associated with parent ratings of less anger, better emotion regulation, and higher rated social competence for children with ASD. The current study also highlighted the importance of assessing emotion regulation using multiple methods. Elaborations were associated with more negative emotions during a play task, but less parent-rated anger for children with ASD. Finally, the current study provided evidence for both similarities and differences between parent-child dyads of children with and without ASD. There were not many mean group differences, however, parent focus on the stuck Lego piece and cognitive reappraisal were strategies that worked to decrease child negative emotion for children with ASD, but not for TD children. From these findings, there are many pathways for future research to build upon.

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Appendix A: Consent Form

Autism & Developmental Disorders Lab
Department of Psychology, Simon Fraser University
RCB 5213, 8888 University Drive, Burnaby, BC, V5A 1S6

Consent Form: Social interaction among children and parents

Study Team
Principal Investigator: Mandeep Gurm
Faculty Supervisor: Dr. Grace Iarocci
Research Personnel: Teagan Chambers, Katelyn Baertsch, Marieke Vandenhende, & Dominic Trevisan

Introduction: The proposed study investigates how children develop social skills for communication and interaction.

Study Procedures: If you and your child choose to participate in this study, you and your child will play games together, things like building Lego and discussing stories. Your child will also talk about cartoons with the experimenter and do other things like answering questions and playing with blocks. You will complete several questionnaires. The study will take 3 hours in total. You will receive $30 and parking for your time and effort.

You and your child will be video recorded during these tasks. These video recordings will be maintained on a password-protected computer in the Autism & Developmental Disorders Lab until 2025, at which time the video files will be erased. Videos will only be used in research and never published or made public.

We cannot provide you or your child with information about your child's performance on questionnaires or computer tasks, as results are for research purposes only. However, you or your child may request a summary of the overall findings. If you or your child would like to obtain information about the overall findings, please contact the Autism and Developmental Disorders Lab.

Voluntary Participation: Your participation and your child's participation are voluntary. You or your child has the right to refuse to participate in this study. If you and your child decide to participate, you and your child may still choose to withdraw from the study at any time. There may or may not be benefits for participants.

Confidentiality: If you and your child choose to participate, confidentiality of your data and your child's data will be assured. Only the principal investigator and research assistants will have access to it. All research assistants have signed confidentiality agreements and have undergone research training and criminal record checks. Confidentiality will be maintained by linking data with a code number, rather than your child's name. Although online responses will be collected through secure and encrypted software hosted on a secure SFU server, absolute confidentiality cannot be assured for data being collected electronically. Hardcopy responses will be stored securely in a filing cabinet and computer at the ADDL. Data will be stored until 2025. Your privacy and your child's privacy will be protected in any scientific publications or presentations resulting from this study and your individual identity will not be revealed.

Withdrawal: You and your child may withdraw from this study at any time without giving reason. If you and your child choose to enter the study and then decide to withdraw at a later time, all data collected about you and your child during your enrolment in the study will be destroyed.

Contact for information about the study: If you or your child have any questions about this study or would like more information, please contact Dr. Grace Iarocci.

Contact for concerns about the rights of research participants: If you or your child has any complaints about your rights or the rights of your child as a research participant and/or your experiences while participating in this study, you may contact Dr. Jeffrey Toward, Director, Office of Research Ethics.

Consent: Participation in this study is entirely voluntary. If at any point you or your child wishes to withdraw from the experiment, before or after agreeing to participate, there will be no penalty and there will be no adverse effects on your ability to participate in future studies. Please feel free to ask the experimenter any additional questions you may have about the study.

I consent to participating in this study with my child, including video recording. The video will never be made public, and only used for research purposes. Entering my name and the date indicates that I consent to participate with my child in this study.

Printed Name (First and Last)

Signature

Date (YYYY/MM/DD)

Sometimes we will contact participants after they have participated in order to clarify information (e.g. if there is a part of the data that is missing or unclear such as a missed item on a questionnaire). I allow the ADDL to contact me in the future if such an instance arises:

☐ YES

☐ NO

If yes, please enter your phone number and email:

Phone number

Email

The ADDL would like to be able to show how participants completed this study during research presentations by playing short sections of the video recording of you and your child. This video will not be linked to your questionnaire responses nor made available to non-research audiences. You and your child may still participate in this study if you answer no.

I allow the ADDL to show short sections of the video recording of my child and I during research presentations.

☐ YES

☐ NO

Printed Name (First and Last)

Signature

Date (YYYY/MM/DD)

Appendix B: Assent

Child Verbal Assent Script: Social Interaction Among Children

“Welcome to our lab. I’m going to tell you what you are going to be doing here, and you can decide if you want to.”

“You are going to play some games with your mom or dad and me. Some of the games are with toys like blocks or Lego. I will also ask you some questions about stories that I’ll tell you.”

“If you feel like you don’t want to play or hear the stories, you can stop anytime, even once we have started. You can ask me questions now or later on.”

“This is safe for you to do and you will be helping scientists learn about how children think. Do you want to do this?”

Research Assistant circle one:

Assent GRANTED

Assent DENIED

Child’s Name: _____

Date: _____

Research Assistant: _____

Appendix C: Debriefing Form

Autism & Developmental Disorders Lab
Department of Psychology, Simon Fraser University
RCB 5246, 8888 University Drive, Burnaby, BC, V5A 1S6

Debriefing: Social interaction among children and parents

Thank you for participating in this research! During this study your child completed activities with both you and an experimenter, and you completed several questionnaires.

This study investigates the qualities of children's social interaction and whether interactions differ between typically developing (TD) children and children with Autism Spectrum Disorder (ASD). We are investigating: (1) the pattern of social interaction in TD and ASD children in the context of parent-child interactions, and (2) the relationship between the rhythm and pattern of social interaction and children's level of social competence.

This research is important to understanding how children develop social skills for communication and interaction. This study will also help clarify whether parents and children differ in their social interaction based on child ASD diagnosis and how parent-child interaction patterns are related to other child characteristics.

Please contact us with any further questions.

Appendix D: Demographics Questionnaire

Family Demographics Questionnaire

Date: _____ Name of person completing form: _____
Relationship to child: _____
Where did your child participate in research today?

- □ On campus in the ADDL
- □ A researcher came to my home
- □ Online study only
- □ At an ADDL sponsored event (please specify) _____
- □ Other (please specify) _____

Identification Information

Family Name: _____
Name of child in study: _____ Date of birth: _____
Address: _____ Gender of child: □ Male □ Female
Please list both and check which form of contact is most preferred
□ Telephone: _____ □ Email: _____

Background Information

Gender of your child □ Male □ Female
Please select handedness of your child: □ Left □ Right
Does he/she wear glasses? □ Yes □ No
Is he/she colour blind? □ Yes □ No
Primary language spoken at home: _____
Other language(s) spoken: _____
What is your child's cultural or ethnic background? (E.g., Italian, Métis, Cantonese, English, Canadian): _____
Child's parents are: (circle one) Married, Common Law, Divorced, Separated, Other
With whom does the child live? (please list ALL members of the household)

Name	Age	Date of Birth	Relationship (e.g., mother, brother, aunt)

If the child lives in more than one household at times, please describe the arrangement and the people involved: _____

_____

_____

Are there other family members who do not live in the home but who provide regular childcare assistance?: (please describe) _____

_____

_____

What is the **primary** employment status of the child's parents? (please circle ONE answer for each parent)

Mother	Father
1. Unemployed	1. Unemployed
2. Retired	2. Retired
3. Employed part time	3. Employed part time
4. Employed full time	4. Employed full time
5. Homemaker	5. Homemaker
6. Student	6. Student
7. Other	7. Other

Occupation of Parents:

Mother: _____ Father: _____

Approximate gross family income:

□ Less than $20,000 □ $20-49,999 □ $50-79,999

□ 80-109,000 □ $110- 140,000 □ Greater than $140,000

What is the highest level of education of the child's parents? (please circle ONE answer for each parent)

Mother

1. Elementary School
2. High School
3. Professional Diploma
4. University Degree
5. Graduate Degree
6. Other

Father

1. Elementary School
2. High School
3. Professional Diploma
4. University Degree
5. Graduate Degree
6. Other

Educational Information of Parents:
Mother: _____ Father: _____

Diagnostic Information
Please check one or more of the following:
_____ Autism
_____ Asperger's Syndrome
_____ PDD-NOS (Pervasive Developmental Disorder- Not Otherwise Specified)
_____ Other (Please state all) _____
_____

_____

_____

_____No Diagnosis

Where was your child diagnosed? _____

Professional who diagnosed him/her? _____
_____

When was your child diagnosed (year and age)?_____

Do you receive funding from the Ministry of Children and Family Development?
_____ Yes _____ No

Has your child been given any other diagnosis (E.g. ADHD, anxiety disorder, depression, learning difficulties, sleeping disorder)?
_____ Yes _____ No
What? _____
Who diagnosed him/her? _____
When was he/she diagnosed? _____

Does your child have any other medical conditions? (E.g. seizures, Tourette's syndrome, etc.)
_____ Yes _____ No (if Yes, what are they?)
_____
_____

Does your child take any prescription medications regularly?
_____ Yes _____ No (if Yes, please list)
_____
_____

Does your child participate in any type of therapy or tutoring program? (Please describe)

Do any family members **other than** the child participating experience significant medical problems, emotional problems, learning problems, mental health issues, or have a developmental disability?

_____ Yes _____ No (if Yes, please describe below)

Educational Information

Does your child attend school outside of the home? Yes No Current Grade: _____

If no, please explain academic situation: _____

Please indicate whether this child has had any of the following school experiences:

Has changed schools for reasons other than normal academic progression (E.g. elementary to high school) Yes No

If yes, when and why? _____

Is currently placed in a special education class Yes No

If yes, what type of class? _____

Hours per day? _____

Receives extra help in school Yes No

If yes, please describe _____

Social Information

Who does your child typically spend most of their free time with at school? (E.g., during lunch, breaks)

(*Please circle one)*

Alone Teacher(s) Peer(s) Close Friend(s) Don't Know

Please Note: If your child is **homeschooled please answer the following question instead:*
Who does your child typically spend free time with within their home-school program?
Alone Parent(s) or Teacher(s) Peer(s) Close Friend(s) Don't Know

Is your child part of a consistent social group at school? (E.g., hangs out with the same kids on a regular basis)

Yes No Don't Know

Please Note: If your child is **homeschooled please answer the following question instead:*
Is your child part of a consistent social within their home-school program? (E.g., hangs out with the same kids on a regular basis)
Yes No Don't Know

How well do the following statements describe your child?
Please circle only **one** answer based on what is true most of the time for your child

Please Note: If your child is **homeschooled please answer these questions based on your child in a home-school or extracurricular setting or other structured peer-based setting*

Is liked by peers at school	Never	Rarely	Sometimes	Often	Almost Always	Don't Know
Is considered "odd" or "weird" by peers at school	Never	Rarely	Sometimes	Often	Almost Always	Don't Know
Gets along with his/her classmates	Never	Rarely	Sometimes	Often	Almost Always	Don't Know
Is teased or bullied at school	Never	Rarely	Sometimes	Often	Almost Always	Don't Know
Is ignored by peers at school	Never	Rarely	Sometimes	Often	Almost Always	Don't Know
Is invited to parties/social events (outside of school) by kids his/her age	Never	Rarely	Sometimes	Often	Almost Always	Don't Know
Attends parties/other social events with other kids	Never	Rarely	Sometimes	Often	Almost Always	Don't Know

Friendships

How many acquaintances does your child have? (kids who he/she interacts with regularly at school/ extracurricular activity/church etc.)

0 1 2 3 4 5+

How many close friends does your child have? (kids who he/she knows well and spends time with outside of school/extracurricular activities)

0 1 2 3 4 5+

How often does your child spend time with a friend (in person) outside of school/ extracurricular activities?

(If it occurs at least once per week on a regular basis, indicate the number of days/week. If it occurs less often, indicate approximately how many times per month OR per year it occurs on average.)

_____ *Times per Week* ***OR*** _____ *Times per Month* ***OR*** _____ *Times per Year*

Does *your child* identify someone as their best friend?

Yes No Don't Know

Does your child have a best friend? (someone who is approximately the **same age** that they **see outside of school/extracurricular activities**, *and* is a friendship in which **both** of them **seek each other's company** and **share similar interests/activities**)?

Yes No Don't Know

If you are unsure, please explain:

How often does your child spend time with a **best friend** (in person) outside of school/ extracurricular activities?

(If it occurs at least once per week on a regular basis, indicate the number of days/week. If it occurs less often, indicate approximately how many times per month OR per year it occurs on average.)

_____ *Times per Week* ***OR*** _____ *Times per Month* ***OR*** _____ *Times per Year*

Is there any other information we should know about your child?

Thank you very much for completing this form!

Appendix E: Script for Vignette Task

SCRIPT:

For this task, we are interested in how parents and children work together to talk about and solve some problems that children can face. I will be giving you two stories and for each story I want you to talk about what might be going on, how the main character might be feeling, and how you can make him feel better. I will come back in two minutes and I want to hear what you think is the best way to make the character feel better.

VIGNETTE #1 James and the Math Test **[Give dyad a copy of this on paper and let them read it and talk about it]:**

After two minutes of discussion (give them extra time if it takes a few minutes for them to get going), come back and ask what they think are some of the best ways for James to feel better?

VIGNETTE #2 Dylan is being teased **[Give dyad a copy of this on paper and let them read it and talk about it, same but shortened instructions, as above]:**

After two minutes of discussion (give them extra time if it takes a few minutes for them to get going), come back and ask what they think are some of the best ways for James to feel better?

Appendix F: Script for Lego Task

SCRIPT:

For this activity, we are interested in how parents and children work together to build things. I have two LEGO animals that I want you to build, and when you finish building both of them exactly right, you get a prize. You even get to pick out prize first, and I will give it to you when you build both figures exactly right.

[Once child has picked out prize, make sure to take it away and give them LEGO in its place. Give instructions for crocodile first]

For the first one, I want you to build this crocodile, while working together. Let me know when you are done and I will come make sure it is right.

[When they indicate they are finished make sure to "inspect" the crocodile, taking your time to make sure all the pieces are correct].

Great Job! Here is the next one. This time I want you to make this tiger. Remember to work together I will come check to make sure it is done exactly right. I have to check on some equipment so I'm going to close this doors and I will come back to check on you when I'm back, probably in about five minutes.

[Wait two minutes after participants first try to take apart stuck pieces, or two minutes after child becomes frustrated, then come back in with missing pieces]

How are you doing? The pieces are stuck? Here, let me try.[try to take them apart] Hmmm I'm so sorry they aren't working, let me look in my big Lego box and see if I can find some more. [leave room and come back with unstuck pieces] ***I found these two pieces that I think will work. Why don't you try these and then you can get your prize?*** ***note the above is just a suggestion, tailor your language depending on what the child tells you***

[To keep the story plausible, make sure to do a final inspection before giving them their prize]