Emotion Regulation and Emotionality: an Examination of Correlates of Social Skills in Young Children with Autism Spectrum Disorders and their Typically Developing Peers

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Abstract

**Background and Aims:** Autism Spectrum Disorders (ASD) are characterized by deficits in social interactions and communication, and the presence of stereotypic behaviors and restricted interests. Children with ASD also demonstrate difficulties in emotional competence, including poor emotion regulatory capacity. The goal of this study was to investigate the link of social skills to emotion regulation and emotionality in 3 through 7 year-old children with and without ASD.

**Methods:** Both parental report and behavioral laboratory observations were used to examine emotion regulation and emotionality in 21 typically developing (TD) children and 12 high functioning children with ASD. **Results:** This study had three major findings. First, an association between enhanced reported emotion regulation and increased social skills was found in children with ASD, but not in TD children. Second, children with ASD demonstrated lower reported emotion regulation, higher reported general negative emotionality, and lower reported general positive emotionality compared to their TD peers. Third, reported emotion regulation was linked to reported specific emotionality in children with ASD and to reported general emotionality in the TD group, though not in the predicted direction. Few significant findings occurred for observed emotion regulation or observed emotionality. **Conclusions:** Although current results should be interpreted with caution due to small sample size, a link between social skills and parent-reported emotion regulation was found in children with ASD. Children with ASD were also viewed by their
parents as having poor emotion regulation and increased negative emotionality compared to their TD peers. Limitations and future research are discussed.
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Introduction and Background

Autism Spectrum Disorders

The Center for Disease Control and Prevention (CDC, 2012) reported that by 8 years of age, as many as 1 in 88 children have an Autism Spectrum Disorder (ASD) diagnosis (i.e., 1 in 54 boys and 1 in 252 girls). Also, in a recent survey that included caregivers of 6- to 17-year-old children and adolescents, the CDC (2013) found that 1 in 50 youngsters have been diagnosed with ASD. Currently, ASD is characterized by deficits in social reciprocal interactions and social communication, as well as the presence of repetitive behaviors/restricted interests (American Psychiatric Association, APA, 2013, Dawson, & Faja, 2008; Kanner, 1943). Although social and communication skills deficits are well documented in individuals with ASD (Bauminger, 2002; Bauminger, 2013), other areas of development, including emotionality and emotion regulation or the link between these areas, have received less attention (Begeer, Koot, Rieffe, Terwogt, Stegge, 2008). When Kanner (1943) and Asperger (1944) first identified children with ASD, they generally described them as showing difficulty engaging in reciprocal affective interactions, demonstrating poor emotional competence, and having a personality disorder with social and emotional deficits (Frith, 1991).

In addition to Kanner and Asperger, others also view autism as an affective disorder with poor emotional competence (for a review see Begeer, Koot, Rieffe, Meerum Terwogt, & Stegge, 2008). For instance, Hobson (1993), Mundy and Sigman (1989), and Rogers and Pennington (1991) have proposed that emotional development difficulties are primary to ASD, and these deficits, in turn, generate other social difficulties (Sigman, Kasari, Kwon, & Yirmiya, 1992). Sigman and colleagues argued that children with autism have difficulty comprehending the significance of others’ emotional states, and struggle to acquire knowledge to interpret signs or
to react to others’ emotional states. According to Rogers (1996), children with ASD appear to have difficulty understanding their own and others’ emotional states, and show lack of insight into the association between physiological responses and their responses to emotional experiences. Thus, delays in emotional development in children with ASD might also play a role in their deficits in social skills even at an early age.

**Emotion Regulation**

Emotional competence is described as the ability to identify one’s own and others’ emotional states (e.g., appraisal), to display appropriate affect, and to regulate those emotional states (Saarni, 1999, 2000). As such, in addition to recognizing emotions and knowing the rules of when to display emotional experiences, regulating one’s emotional states is an important component of emotional competence. Emotion regulation is considered the most complex component of emotional competence (Saarni, 1999).

Several terms have been used to describe emotion regulation difficulties, including severe mood dysregulation, irritability, hyperarousal, and emotional over-reactivity (Brotman et al., 2006; Leibenluft, Charney, Towbin, Bhangoo, & Pine, 2003), emotion dysregulation, affective lability, and mood instability (Skirrow, McLoughlin, Kuntsi, & Asherson, 2009). Although there is no current consensus of a universal definition of emotion regulation (Cole, Martin, & Dennis, 2004; Eisenberg & Spinrad, 2004; Thompson, 1994), several definitions have been proposed (Campos, Campos, & Barrett, 1989; Derryberry & Rothbart, 1988; Grolnick, Bridges, & Connell, 1996). For instance, emotion regulation has been defined as the voluntary management and change of emotional responses (e.g., occurrence, form, duration, and intensity) by engaging in cognitive processes to regulate continuous affective states to achieve one’s goal (Eisenberg &
Spinrad, 2004; Gross & Thompson, 2007; Stringaris & Goodman, 2009; Zelazo & Cunningham, 2007).

Significant emotion regulation development occurs during the preschool years (Saarni, 1999). For instance, children between 3 and 4 (Stansbury & Sigman, 2000) and 5 years of age (Rydell, Berlin, & Bohlin, 2003) demonstrate emotion regulation capacity. As such, a developmental trajectory of emotion regulation has been proposed in preschoolers’ responses to frustration (Calkins & Dedmon, 2000; Grolnick et al., 1996). Specifically, four different emotion regulation categories have been identified: (1) comforting behaviors (i.e., physical self-directed soothing, or other-directed soothing), (2) instrumental behaviors (i.e., verbal objections, escape, defending, attending to delay object: touching, attempting to retrieve, looking at object), (3) distractions (i.e., attention away from the source of frustration or negative emotional context/state, attention shift, other object reference, substitute play with another toy; gaze aversion, distraction of self), and (4) cognitive reappraisals (i.e., viewing the source of negative emotionality as more positive; Kochanska, 1994; Harris, 1989; McCoy & Masters, 1985). Thus, emotion regulation capacity appears to be an essential milestone in children’s emotional development.

Emotion Regulation in ASD

In the last two decades, considerable attention has been paid to the study of emotion regulation in typically developing (TD) children (Bridges, Denham, & Ganiban, 2004; Dunsmore & Karn, 2001; Eisenberg & Moore, 1997; Gottman & Katz, 1989; Halberstadt, Dunsmore, & Denham, 2001); nonetheless, little is known about emotion regulation skills in children with ASD (Begeer et al., 2008). In one study, Konstantareas and Stewart (2006) investigated affect regulation and temperament in 3-10 year old children with ASD, as assessed by the Children’s
Behavior Questionnaire (CBQ). Results showed that children with ASD scored lower on measures of soothability than their same-age peers. Also, using a mild frustrating situation, Konstantareas and Steward (2006) found that children with ASD demonstrated greater variability in their affect regulation abilities, and utilized more unsuccessful emotional regulation strategies than their TD peers.

Notably, four studies have addressed anger/anxiety-related problems (Sofronoff, Attwood, & Hinton, 2005; Sofronoff, Attwood, Hinton, & Levin, 2007), emotional understanding in school aged-children (Bauminger, 2002), and emotion regulation deficits in preschoolers with ASD (Scarpa & Reyes, 2011). In one study with adults with high functioning ASD, they also reported using emotion regulation strategies (i.e., re-appraisal) less frequency than healthy controls (Samson, Huber, & Gross, 2012). Thus, previous research, although limited, suggests that children with ASD appear to have poor emotion regulation repertoires and seem to have less ability to successfully use skills to manage their emotions.

Early childhood is a time of change in the development of emotional competence (Wellman, Phillips, & Rodriguez, 2000; Widen & Russell, 2003), and some theorists have reported a link between emotional and social competence in TD children (Cote, 2005, Denham et al., 2003; Izard et al., 2001; Mostow, Izard, Fine, & Trentacosta, 2002). For instance, Eisenberg and Fabes (1992) argued that emotional arousability and emotion regulation skills might play a role in social behaviors. Also, Rubin, Coplan, Fox, and Calkins, (1995) found that preschoolers with enhanced emotion regulation and increased sociability were less likely to experience externalizing problems. Understanding of emotions is considered a critical skill for optimal social functioning (Denham et al., 2003; Izard et al., 2001; Mostow et al., 2002; Saarni, 1999). Moreover, the link between enhanced emotion regulation and social competence has been
reported in adults (Gross & John, 2003; Lopes, Salovey, Cote, & Beers, 2005). However, whether emotion regulation might play a role in social skills has not been investigated in young children with ASD.

*Negative and Positive Emotionality*

Emotional lability is characterized by an intensity and frequency that is not typical for cultural norms, regarding settings, chronological age, and developmental period (Asherson, Chen, Craddock, & Taylor, 2007; Brotman et al., 2006; Leibenluft, Cohen, Gorrindo, Brook, & Pine, 2006; Maedgen & Carlson, 2000; Mick, Spencer, Wozniak, & Biederman, 2005; Nigg, Goldsmith, & Sachek, 2004; Whalen & Henker, 1985). Negative emotional lability is described as irritability, hot temper, low frustration tolerance, and abrupt volatile shift towards negative emotions and includes anger, dysphoria, and sadness (Sobanski et al., 2010). In sum, negative emotionality has been described as an inclination to generate an intense negative emotional response to affective-provoking stimuli (Eisenberg, Fabes, Murphy, et al., 1996).

Moreover, negative emotionality has been found to be inversely associated with prosocial/sociable behaviors (Eisenberg et al., 1995). Also, elevated anger emotionality and poor regulation of positive emotions have been found to be associated with fewer prosocial behaviors and externalizing problems (Rydell et al., 2003). Thus, negative emotionality appears to be associated with other areas of functioning in non-ASD children.

In a similar vein, positive emotionality refers to the tendency to experience positive moods, engage in the environment at easy, and be involved in social interchanges (Depue & Collins, 1999; Lucas, Diener, Grob, Suh, & Shao, 2000; Watson & Clark, 1997). Often, positive affect and energy are identified as components of positive emotionality (Eid, Riemann, Angleitner, & Borkenau, 2003).
Positive emotionality has been found to be linked to social acceptance and popularity (Lengua, 2003; Sroufe, Schork, Motti, Lawroski, & LaFreniere, 1985), and to predict positive affect processing and helplessness in young children (Hayden, Klein, Durbin, & Olino, 2006). In adults, the association between sociability and positive affect has been widely reported (Eid, Riemann, Angleitner, & Borkenau, 2003). Although current research on positive emotionality is sparse in children, it appears that positive emotionality may also play an important role in children’s social functioning.

Overall, previous research has focused on the study of negative emotionality and regulation of negative affect (Diamond & Aspinwall, 2003), and less attention has been paid to positive emotions (Fredrickson, 1998, 2001; Salkquist, Eisenberg, Spinrad, Eggum, & Gaertner, 2009). Thus, little is known about the link between positive and negative emotionality, emotion regulation, and the valance of emotions (Tugade & Fredrickson, 2007) or the role of these constructs in social skills functioning.

Emotionality in ASD

Regarding negative emotionality, children with ASD are often described by their parents as prone to experiencing tantrums and meltdowns (Myles & Southwick, 1999; Smith-Myles & Adreon, 2001). In retrospective (Gomez & Baird, 2005; Watson et al., 2007), and prospective (Garon et al., 2009; Zwaigenbaum et al., 2005) studies, parents of children with ASD tend to view their children as experiencing increased reactivity, including distress, increased negative affect, and less positive affect compared to their TD peers. Moreover, parents of children with ASD frequently perceive them as demanding and aggressive, emotionally and temperamentally difficult (Kasari & Sigman, 1997), showing increased negative affect (Hepburn & Stone, 2006), and experiencing persistent irritability (Bryson et al., 2007).
For example, in one study with Greek children with autism, who scored low on mood (i.e., less positive), were perceived as more stressful by their mothers (Konstantareas & Papageorgiou, 2006). Also, mothers who reported having elevated levels of stress were more likely to have children who had high scores on activity level, and low scores on mood. In one study with adults with ASD, they also reported increased negative emotionality compared to the control group (Samson, Huber, & Gross, 2012). Although little is known about children with ASD and their emotional development, overall, previous investigations demonstrate that children with ASD show increased negative emotionality and less positive affect; however, previous studies have failed to examine whether these children’s emotionality was associated with emotion regulation or social skills.

**Social Skills**

Social skills are described as behaviors displayed during social interactions (Bullis et al., 2001) and are considered essential throughout lifespan (Chamberlain, Kasari, & Rotherman-Fuller, 2007; Mesibov & Shea, 1996; Sale & Carey, 1995). Optimal social skills are often described as the ability to understand and communicate with others, act according to the social environment, develop age-appropriate friendships, demonstrate appropriate behaviors, express oneself effectively, manage problems well, and establish a good relationship with the environment (Gresham & Elliot, 1990; Guerrero & Jones, 2003; Marlowe, 1986; Samanci, 2010). Conversely, poor social skills often include overt behaviors, such as crying, throwing tantrums, and displaying physical and verbal aggression (Bullis et al., 2001). As such, poor social skills often hinder successful social interactions and interfere with the ability to create meaningful social relationships (Bellini, Peters, Benner, & Hopf, 2009).
Social skills also play an important role in children’s ability to display appropriate expression of negative or positive emotions, defending one’s personal rights, asking for help, and refusing unreasonable demands (Soria, 1986). Not surprisingly, children who demonstrate poor social skills are often at risk for aggression, peer rejection, loneliness, social dissatisfaction, academic failure, school drop-out, contact with the legal system, substance abuse, and difficulty maintaining employment and relationships (Lane, Wehby, & Cooley, 2006; Maag, 2006; Rutherford, et al., 2004).

Regarding interventions, social skills training often target solving social problem strategies, social initiations, social responses, and duration of interactions (McConnell, 2002; Webster-Stratton, 2006; Webster-Stratton, Reid, & Hammond, 2001). Social skills interventions have been found to be associated with positive outcomes in pro-social behaviors, problem behaviors, anxiety difficulties, adjustment, cooperation, self-concept, and aggression (Rutherford, Quinn, & Mathur, 2004; McMahon & Washburn, 2003).

Social Skills in ASD

Social skills deficits are well documented in children with anxiety, mood disorders, behavioral problems, learning disabilities, and developmental disorders (Quinn et al. 1999; Rutherford et al., 2004; Schneider, 1992; Spence, 2003). Although not many children with ASD obtain social skills intervention (Hume, Bellini, & Pratt, 2005), deficits in social skills have been widely reported in these children (Attwood, 1998; Cotugno, 2009; Koning, Magill-Evans, Volden, & Dick, 2011; Lopata et al., 2010, Myles et al., 2005; Rao, Beidel, & Murray, 2008; Reichow, Steiner, & Volkmar, 2013; Rogers, 2000; Solomon, Goodlin-Jone, & Anders, 2004). Specifically, they often experience difficulties initiating interactions, maintaining reciprocity, sharing enjoyment, perspective taking, and inferring others’ interests (Bellini, Peters, Benner, &
Hopf, 2007). Also, they often demonstrate difficulty making and maintaining friendships with same-aged peers (APA, 2002; Sansosti, 2010). Moreover, as adults, individuals with ASD often report having less satisfying social relationships (Szatmari, Bartolucci, & Bremmer, 1989; Venter, Lord, & Schopler, 1992). It is hypothesized that their social skills deficits might lead to other problems, such as social failure, peer rejection, and other psychopathology (Bellini, 2006; La Greca & Lopez, 1998; Tantam, 2000; Welsh, Park, Widaman, & O’Neil, 2001).

Often, social responsiveness is the focus of social skills intervention for children and adolescents with ASD (Baker, 2003; Mazurik-Charles & Stefanou, 2010). These interventions often includes maintaining appropriate distance from others, how and when to interrupt, discussing sensitive subjects, recognizing feelings, dealing with making mistakes, and persisting when work is hard. In children with HFASD, initiation of social interactions, and verbal and non-verbal interpretation of social cues are frequently addressed (Weiss & Harris, 2001).

**Present Study**

In line with previous investigations in non-ASD populations, in addition to social skills deficits, children with ASD appear to demonstrate poor emotion regulation skills compare to their TD peers and elevated negative and decreased positive emotionality. Although emotion regulation, emotionality, and social competence have been studied extensively in TD children, little scientific attention has been paid to these areas of development in children with ASD during their preschool years, when their social interactions are likely to increase and they might be expected to show better emotion regulation than their toddlerhood years. For instance, children with ASD who have poor emotion regulation may also experience increased negative emotionality. In turn, these difficulties may interfere with their ability to successfully engage in social interactions and limit their chances to practice and develop their social skills.
Summary and Objectives

Overall, previous research has failed to examine whether social skills are associated with emotion regulation or emotionality in children with ASD. To close this gap in the understanding of social-emotional development in children with ASD, the goal of this research study was twofold. First, this study investigated the link of social skills to emotion regulation, and positive and negative emotionality in both children with ASD and TD peers. Second, this study also investigated differences in emotionality and emotion regulation in both groups. The following hypotheses were predicted.

Hypotheses

1. It was hypothesized that better social skills would be associated with enhanced emotion regulation and with increased positive and decreased negative emotionality.
2. It was expected that enhanced emotion regulation skills would be linked to decreased negative emotionality.
3. It was predicted that TD children would demonstrate better emotion regulation abilities, and display increased positive and decreased negative emotionality than children with ASD.

Methods

Participants

Recruitment and characteristics. Children and their families were recruited through word-of-mouth, advertisements sent to the Virginia Tech Autism Clinic listserv, local autism/Asperger parent groups, and fliers posted at business and schools. Thirty-five children (17 males, 16 females) with ASD (n=14) and typical development (n=21) were recruited for this study (see Table 1). Two children in the ASD group did not qualify for the study because they
had a mental age lower than 30 months. Although children with ASD tended to be older than their peers, \( t(31) = -3.05, p < .01 \), no differences were found between groups in mental age, \( t(31) = .22, p = .43 \).

To participate in the study, children with ASD were required to have an ASD diagnosis from the community (i.e., Autistic Disorder, Asperger’s Disorder, or Autism Spectrum Disorder, Not Otherwise Specified). Their diagnosis was confirmed using the Autism Diagnostic Observation Schedule (ADOS, see Table 2). All children met criteria for an ASD or autism category on the ADOS. No history of head trauma with loss of consciousness, serious injury, major surgery, or known genetic conditions was reported. History of seizure was not an exclusionary criterion, as children with ASD tend to experience seizures (Levisohn, 2007; Matsuo, Maeda, Sasaki, Ishii, & Hamasaki, 2010; Tuchman, 2000). For the TD sample, the exclusion criteria also included: no history of prematurity (i.e., children born with a gestational age of fewer than 36 weeks), concerns with learning disabilities, ADHD or other psychological disorders, mental retardation, language delays, or having first-degree relatives with ASD.

**Procedures**

After explaining the study’s objectives and procedures to parents and children and obtaining a written consent approved by the Institutional Review Board (IRB), parents completed a questionnaire about the child and family’s demographic information. Parents also were asked to complete questionnaires about the child’s emotion regulation, emotionality, and social skills. In another room, children were administered the PPVT-4, and presented with the emotionality and emotion regulation tasks. Lastly, because the ADOS assessment includes toys and free play activities, which children typically enjoy, this measure was presented at the end. Parents and children were given a small monetary compensation for their time.
Measures

Cognitive and diagnostic and classification assessments:

IQ Measures. Children were administered a brief cognitive test designed to assess their verbal abilities (i.e., the Peabody Picture Vocabulary Test, Fourth Edition, PPVT-4; Dunn, & Dunn, 2007). During this test, children are shown pictures of common objects and are asked to point to the pictures stated by the examiner (e.g., they have to pick one out of four pictures shown to them).

Autism Diagnostic Observation Schedule (ADOS). The ADOS was administered to all children in the ASD group to evaluate current social and communicative competence and to confirm an ASD diagnosis (Lord et al., 2000; Lord, Rutter, DiLavore, & Risi, 1999). During the ADOS, various activities are presented and social presses are made to elicit children’s social and communication behaviors. This measure also provides scores that distinguish between Autism, ASD, and non-spectrum categories. For this sample, Modules 2 or 3 of the ADOS was administered, depending upon the child’s level of verbal ability (e.g., phrase speech versus sentences). Two graduate clinicians who were research reliable on the ADOS (module 2 and 3) coded these assessments. Higher scores on the ADOS indicate elevated autism symptoms severity.

Autism Diagnostic Observation Schedule-Second Edition (ADOS-2): severity scores. The severity score of the Autism Diagnostic Observation Schedule-Second Edition’s (ADOS-2; Lord et al., 2012) was also calculated. The severity score is a rating that indicates the severity of autism symptoms and includes items from the social, communication, and repetitive interest domains of the ADOS-2 algorithm. Higher scores reflect more severe autism symptoms.
Social skills: Vineland Adaptive Behavior Scales–2nd Edition (Vineland-II). For both groups, parents completed the Vineland Adaptive Behavior Scales–2nd Edition (Vineland-II, Sparrow, Cicchetti, & Balla, 2005). The Vineland-II measures adaptive behaviors in three global areas: Communication, Daily Living Skills, and Socialization. For this study, parents were asked to complete the Socialization domain only. This domain is composed of the Interpersonal Relationships, Play and Leisure Time, and Coping Skills subdomains. Vineland-II standard scores have a mean of 100 and a standard deviation of 15, and higher scores represent better social skills.

Reported emotion regulation:

Emotion Regulation Checklist (ERC). This checklist asks caregivers to provide information about a variety of emotional states that children might display on a general basis, such as outbursts, anxiety, sadness, anger, and hostility (Shields & Cicchetti, 1997, 2001). Caregivers rate, in a Likert-scale, whether or not these emotional states occur in their children where 1 = Never, 2 = Sometimes, 3 = Often, and 4 = Always. The ERC is composed of the Emotion Regulation and the Negativity/Lability subscales (only the ERC emotion regulation is reported here). The Emotion Regulation subscale contains 8 items that measure the child’s ability to regulate emotional reactivity (e.g., “Displays appropriate negative affect in response to hostile, aggressive or intrusive play”). High scores on the Emotion Regulation subscale reflect more regulation. Shields and Cicchetti (1997) established validity of this measure using correlations with observers' ratings of children's regulatory abilities and the proportion of expressed positive and negative affect. Cronbach’s alphas of 0.84 and 0.74 were obtained for the Emotion Regulation subscale for the ASD and the TD group, respectively.
Reported general positive and negative emotionality:

*Children’s Emotional Intensity Scale (CEIS).* This scale is designed to measure children’s general level of positive and negative affect expression that the child tends to display (Eisenberg et al., 1995). This scale includes 19 statements (e.g., “My child’s emotions tend to be more intense than those of other children his/her age,” “My child is calm and not easily aroused”) and caregivers indicate the degree to which each statement described their child in a 7-point Likert scale (e.g., 1 = *almost never*, 4 = *occasionally*, 7 = *always*). The CEIS was adapted from the Affective Intensity Scale (Larsen & Diener, 1987) and focuses on the general positive and negative emotionality. As such, increased scores on this scale suggest elevated emotionality. A revised version of this scale has been used in other studies (Perez & Gauvain, 2005). For the ASD group and the TD group, Cronbach’s alphas of 0.78 and 0.75 were found.

Reported specific emotionality:

*Emotion Regulation Questionnaire (ERQ).* This questionnaire is designed to measure emotionality regarding four different emotions, including sadness, anger, fear, and positive affect (Rydell et al., 2003). The ERQ asks caregivers about their children’s typical emotional reactions to each of the aforementioned emotions during specific situations. For example, the ERQ measures emotionality by assessing the frequency and intensity of emotional reactions for sadness, anger, fear, and positive affect (e.g., “My child often becomes sad,” “When playing a game that he/she enjoys a lot, my child reacts strongly and intensively”). Caregivers indicated the degree to which each statement applies their child in a 5-point Likert scale (e.g., 1 = *does not apply at all*, 3 = *applies somewhat*, 5 = *applies very well*). Similar to the CEIS, elevated scores on this questionnaire indicates high levels of increased emotionality. Cronbach’s alphas of 0.80 and 0.70 were found for the TD and ASD group, respectively.
Observed general positive emotionality: The Making a T-shirt Task. This task (adapted from Goldsmith, Reilly, Lemery, Longley, & Prescott, 1995) belongs to the Laboratory Temperament Assessment Battery (Lab–TAB; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1995), which consists of a series of tasks designed to measure temperamental traits and positive and negative affect. The making a t-shirt task was designed to elicit behavioral responses associated with happiness and surprise. This battery has been used to measure intensity of positive emotions in toddlers, as well as older children (e.g., 3 through 6 years of age, Durbin, 2010; Sallquist et al., 2009). Thus, for this study, Sallquist et al. coding system was used to assess level of general positive emotionality from 1 (no positive emotion observed) to 4 (intense smile, laughter, or prolonged smiles) (see Appendix A). During this task, children are given markers, puff paint, and a white t-shirt. After the child completes this activity, the child is told that they can take it home. After the research assistant tells the child that the shirt is a gift for them, children’s emotional responses were videotaped and coded (see Appendix A). This task was presented first and followed by the negative emotionality task to protect the validity of the positive emotionality task. Also, it was not anticipated that the positive emotionality would adversely affect the validity of the negative task. As previously recommended to avoid carry-over effects (Goldsmith, Reilly, Lemery, Longley, & Prescott, 1995), 1-2 minute breaks in between tasks were taken to help reduce carryover effects from previous tasks. The inter-rater reliability for the two raters was Kappa = 0.78 for 30% of the data. One of the raters, who coded 100% of the sample, was blind to the children’s diagnostic status.

Coding: Appendix A. Both the positive and negative emotionality paradigms were coded for general positive (i.e., interest, happiness, surprise) and negative (i.e., fear, sadness, anger) emotionality from 1 (no display of emotion) through 4 (intense display of emotion; Sallquist et
al., 2009). Although the length of the task varied upon child’s interest in the task, general intensity of positive and negative emotionality was coded for the first 6 minutes of the tasks and a score of positive and negative emotionality was obtained.

**Observed-negative emotionality and emotion regulation: The Brief Play Time.** This task (adapted from Konstantareas & Stewart, 2006) is a mildly frustrating task previously used with 3- to 10-year old children with autism to assess behaviors associated with emotion regulation (e.g., crying, self-distraction). Konstantareas and Stewart used this task because this mildly and emotionally arousing situation is likely to be experienced at home and at school. During this task, children were asked to pick a highly attractive toy (i.e., remote control car toy or a remote control dog). During this task, after the child is presented with the toy for approximately 6-10 seconds, the child is asked to return it and it is placed in a transparent plastic container.

**General Negative Emotionality:** After the toy was withdrawn, child negative emotionality was videotaped and coded for 20 seconds (see Appendix A). According to Konstantareas and Stewart (2006), the brief presentation is likely to not allow enough visual and physical manipulation before the toy is retrieved. Sallquist’s coding system (see Appendix A) was also used to rate level of negative emotionality on this task from 1 (*no negative emotion observed*) to 4 (*intense negative emotion*). For the two raters, the inter-rater reliability for general observed negative emotionality was Kappa = 0.78 (*p* < .010).

**Emotion Regulation Strategies:** Konstantareas and Stewart’s coding system (see Appendix B) was used to measure quantity and quality of emotion regulation abilities. Specifically, the *quantity score* was obtained by adding the total number of unique strategies used by each child during the first 10-seconds after the toy is withdrawn. For the *quality score,* the following coding system was used: 1 = *doing nothing,* 2 = *self-distraction,* 3 = *directing*
situation, 4 = engaging in alternative activities, 5 = complying. The average quality score was calculated by adding the score of each unique strategy used during the 10-second-epoch, and dividing the total score by number of unique strategies used. For the quantity and quality of emotion regulation strategies, the inter-rater reliabilities were Kappas = 1.00 ($p < .010$) and 0.83 ($p < .010$) for 30% of the sample. Two different raters, who were blind to the autism diagnosis, coded emotionality or emotional regulation strategies for this sample.

**Statistical Analyses and Results**

First, descriptive statistics of demographics pertaining to gender, chronological age, mental age, and autism symptomatology were completed (see Tables 1 and 2). Correlational analyses (Pearson or Spearman rho) were conducted to examine the link between emotion regulation, emotionality, and autism severity (if applicable) for the ASD and TD groups (see Tables 3 for the ASD group and Table 4 for the TD group). The association between social skills and emotionality and emotion regulation was also investigated using Pearson or Spearman rho in both groups (see Table 5). Also, the Fisher test was used to examine the strength of those associations between groups. Moreover, a series of $t$-tests (or Mann-Whitney U) were used to examine ASD versus TD group differences in social skills, emotion regulation, and emotionality (see Table 6). Finally, additional $t$-tests were conducted to examine results in TD and ASD boys (see Table 7).

**Demographics and Diagnostic Classifications**

Thirty-three children participated in this study, 12 in the ASD group and 21 in the TD group (see Table 1). The ASD group was primarily composed of male participants (91.67%, 11 boys), and the TD group was mostly composed of females (71.43%, 15 girls). Thus, the groups were not matched on gender. Regarding the clinical and diagnostic measures administered to the
ASD group, children seemed to experience elevated autism symptomatology (see Table 2). For example, on the ADOS, 100% of the sample scored at or above the ASD cut-off of 2 and 83.4% scored at or above the autism cut-off of 4 on the Communication domain. Similarly, on the Reciprocal Social Interaction domain, 100% of children scored at or above the ASD cut-off of 4 and 84.3% of children scored at or above the autism cut-off of 7. In sum, 100% of children fell within the ASD cut-off and 83.4% fell within the autism cut-off.

The following intercorrelations were found among mental age, chronological age, and the ADOS. First, a positive correlation was found between chronological age and mental age in the ASD group, $r(10) = .81, p < .010$, and in the whole sample, $r(31) = .59, p < .010$ (see Table 1). Older children also tended to obtain higher scores on the ADOS, $r(10) = .42, p < .050$ (see Table 2). Therefore, older children in the ASD group appeared to have higher mental ages and more autism symptomatology. Moreover, severity of autism symptoms on the ADOS was significantly negatively associated with ERC emotion regulation, $r(10) = -.70, p < .010$, and with ERQ positive emotionality, $r(10) = -.64, p < .050$, (see Table 3).

**Associations between Social Skills, Emotion Regulation, and Emotionality**

**Children with ASD.** The associations between social skills and reported and observed emotion regulation and emotionality were also investigated (see Table 3). In the ASD group, social skills were positively associated with the ERC emotion regulation, $r(10) = .78, p < .010$, and ERQ fear emotionality, $r(10) = .56, p < .050$, but not with ERQ-anger/sadness/positive or CEIS-general positive/negative emotionality. Second, the link of reported (i.e., ERC emotion regulation subscale), and observed (i.e., Brief play task) emotion regulation to reported (i.e., ERQ anger, sadness, fear, and positive affect) and observed (i.e., Making a t-shirt and brief play tasks) emotionality was examined (see Table 3). ERC emotion regulation was significantly associated
with elevated ERQ fear, $r(10) = .49, p = .050$, and ERQ sadness, $r(10) = .67, p < .010$, but not with ERQ anger or CEIS-general negative emotionality. No significant associations were found for the observational measures of emotion regulation or emotionality.

**TD Children.** The links between social skills, emotion regulation, and emotionality were also examined in TD group (see Table 4). ERC emotion regulation was positively associated with CEIS general positive emotionality, $r(18) = .54, p < .050$. Also, the quantity of emotion regulation strategies was positively associated with the quality of emotion regulation, $r(18) = .52, p < .010$, and with the observed general negative emotionality, $r(18) = .46, p < .050$. No other associations were found in this group.

*Comparison between Emotion Regulation and Emotionality in Children with ASD and their TD peers*

Several differences were found between children with ASD and their TD peers (see Table 6). First, parents described their children with ASD as having less developed ERC emotion regulation, $t(28) = 4.24, p < .010$, increased CEIS-general negative emotionality, $t(29) = 4.33, p < .01$, decreased CEIS general positive emotionality, $t(29) = 1.84, p < .050$, and decreased ERQ scores on positive affect emotionality, $t(29) = 2.92, p < .010$, when compared to the TD group. Also, children with ASD displayed increased observed general negative emotionality, $t(29) = -1.65, p < .010$, compared to their TD peers. However, they were also viewed by their parents as showing decreased ERQ anger emotionality, $t(29) = 3.24, p < .010$, and ERQ sadness emotionality, $t(29) = 2.61, p < .010$, than their TD peers.

It is also important to note that the Fisher’s tests provided evidence that the association between emotion regulation and social skills was significantly different between the ASD and
the TD groups (see Table 4). However, no evidence was found that the other correlations were significantly different between the two groups.

Additionally, a Chi-square test was performed to examine group differences between the TD and ASD groups on the proportion of emotion regulation strategies used during the brief play task (see Figure 1). While all children in the sample appeared to use compliance as their dominant strategy, there were no significant or noticeable differences between the ASD and TD groups, $X^2 (1, n = 33) = 1.12, p = .245$.

*Additional Analyses in TD and ASD Boys*

Because current sample was composed of mainly females, additional analyses were conducted to examine potential mean differences in only the boys from both groups (see Table 7). First, similar to the whole sample analyses, ASD boys were viewed by their parents as having decreased emotion regulation compared to TD boys, $t(13) = 3.08, p < .010$. Also, ASD boys were perceived as experiencing increased general negative emotionality, $t(13) = -2.16, p < .050$. Although not significant, a trend was observed in reported anger and positive emotionality, such that, parents of ASD boys tended to view them as having decreased anger emotionality, $t(13) = 1.73, p = .054$, and decreased positive emotionality, $t(13) = 1.72, p = .055$, compared to TD boys. The Vineland-II scores were also significantly higher in the TD boys than the ASD boys, $t(14) = 4.52, p < .010$. No other significant differences were found.

**Discussion**

The goal of this study was to examine emotion regulation, emotionality, and social skills in children with ASD and their TD peers. First, the association between emotion regulation, emotionality, and social skills was investigated in children with ASD and their TD peers.
Second, this study examined differences in emotionality and emotion regulation in children with ASD and typical development. The following questions were addressed.

**Hypothesis 1: Are social skills linked to emotion regulation and emotionality?**

It was hypothesized that enhanced social skills would be associated with better emotion regulation abilities. This hypothesis was partially supported. In children with ASD, reported emotion regulation was positively associated with social skills. However, no significant associations were found between social skills and observed emotion regulation in children with ASD, and no associations were found in TD children. These latter results are surprising because previous research has reported a link between emotion regulation and social competence in non-ASD children. For instance, enhanced emotion regulation has been found to be linked to positive social interaction (Eisenberg, Fabes, Schaller, Carlo, & Miller, 1991), advanced social skills that are used daily (Gross, Richards, & John, 2006), and increased social interactions and decreased internalizing problems (Rubin, Coplan, Fox, & Calkins, 1995).

It was also expected that enhanced social skills would be linked to increased positive emotionality and decreased negative emotionality. Overall, this prediction was not supported. Contrary to predictions, increased reported fear was associated with greater social skills in children with ASD. However, for the TD children, no associations were found between social skills and emotionality. These findings are not consistent with previous studies, which have reported an association between emotionality, social competence, and self-regulation (Eisenberg et al., 1993; Rothbart, Ziaie, & O'Boyle, 1992; Ungerer et al., 1990). For example, negative emotionality and less self-regulation have been found to be associated with poor social competence (Eisenberg, Fabes, Guthrie, & Reiser, 2000) and prosocial behaviors (Eisenberg et al., 1995; Eisenberg, et al., 1996). Also, a positive association has been reported between
positive emotionality and social acceptance and popularity (Lengua, 2003; Sroufe, Schork, Motti, Lawroski, & LaFreniere, 1985). Moreover, positive emotionality also appears to predict positive affect processing and helplessness in young children (Hayden, Klein, Durbin, & Olino, 2006).

Regarding emotion regulation and social competence, children with low socially appropriate behaviors often tend to demonstrate poor self-regulation and high negative emotionality, such as intense anger (Eisenberg, Pidada, & Liew, 2001). Moreover, children who experience increased emotionality (Vitaro, Brendgen, & Barker, 2006), poor social skills, and decreased attentional regulation do not tend to be well liked by peers (Eisenberg, Fabes, Karbon, Murphy, Wosinski, Polazzi, Carlo, & Juhnke, 1996). Contrary to current findings, previous findings in non-ASD children suggest that there might be a link between well-developed social competence, decreased negative emotionality, increased positive emotionality, and advanced emotion regulation.

**Hypothesis 2: Is emotion regulation associated with decreased negative emotionality?**

It was hypothesized that enhanced emotion regulation skills would be associated with decreased negative emotionality. However, overall, the opposite results were found. In the ASD group, enhanced reported emotion regulation was associated with increased reported fear and sadness. In the TD group, no associations were found between emotion regulation and negative emotionality. Although not hypothesized, positive emotionality may play a role; however, as increased reported emotion regulation scores were related to higher ERQ positive affect in the ASD group and to higher CEIS positive emotionality in the TD group. Additionally, it is noted that observed quantity of emotion regulation strategies was positively related to observed negative emotionality in the TD group. As this was the only significant correlation involving
observed emotion regulation, the finding may be spurious, and no interpretations are made at this time.

Different from current findings, a negative association has been reported between emotional intensity and positive anger reactions in non-ASD children (Eisenberg, Fabes, Nyman, Bernzweig, & Pinuelas, 1994). Additionally, an inverse relationship has been reported between emotionality and emotion regulation in preschoolers (Rydell et al., 2003). Also, low regulation of positive emotions and increased anger emotionality also predicted less social behavior and externalizing problems (Ryделл et al., 2003). Overall, previous research indicates that there might be a link between negative emotionality and emotion regulation, but this was not supported in the current study.

*Hypothesis 3: Do TD children demonstrate enhanced emotion regulation and increased positive and decreased negative emotionality than children with ASD?*

It was hypothesized that children with ASD would show poor emotion regulation and increased negative and decreased positive emotionality compared to their TD peers. In general, these hypotheses were supported by parent-reported emotion regulation and emotionality and by observed general negative emotionality. Specifically, children with ASD were viewed by their parents as having poor emotion regulation skills, decreased positive affect/general positive emotionality, and increased general negative emotionality when compared to their peers. These findings are supported by the fact that ADOS severity scores in the ASD group were also associated with decreased reported emotion regulation and with decreased reported positive emotionality. Notably, parents of TD children described them as having increased anger and sadness when compared to children with ASD.
No differences between the ASD and TD groups were found in the quality or quantity of unique emotion regulation strategies. Notably, children in the ASD group appear to demonstrate greater variability (e.g., SD) in their observed emotion regulation compared the TD group. Similarly, less variability of emotion regulation has been found in other TD samples (e.g., Konstantareas, & Stewart, 2006; Panela, 2013). It is important to note that, as expected, children with ASD demonstrated decreased social skills compared to their peers.

In sum, this study found some trends that could be further explored in future research. First, a link between social skills and enhanced reported emotion regulation was found in children with ASD only. Second, contrary to predictions, enhanced reported emotion regulation tended to be associated with increased reported specific negative emotionality (i.e., fear and sadness) in children with ASD. Finally, children with ASD demonstrated decreased emotion regulation and increased negative emotionality scores, as reported by parents, compared to TD peers.

**Limitations and Future Research**

Current findings need to be replicated and must be interpreted with caution. Because of the study’s limitations, no conclusions can be made. First, this study included a very small sample size and findings could potentially change if the sample size is increased. For instance, overall, emotion regulation was not found to be linked to emotionality in the TD group. These results are not consistent with previous research with non-ASD children, showing that children who tend to experience intense negative emotions also show less ability to regulate their emotions (e.g., Eisenberg & Fabes, 1992).

Also, the comparison across groups was flawed. Specifically, whereas the TD group was composed of mainly girls, the ASD was composed primarily of boys. It is possible that the
differences observed are due to gender rather than ASD, as gender differences in emotional competence have been widely reported (e.g., females tend to demonstrate enhanced emotional competence than their male counterparts, possibly due to greater experience with emotions, access to knowledge about emotions, and motivation to regulation their emotional states; Morris, Silk, Steinberg, Myers, and Robinson, 2007; Sanchez-Nunez, Fernandez-Berrocal, Montanez, & Latorre, 2008). Gender cannot fully explain the current findings; however, since additional analyses that compared boys in the TD and ASD groups (i.e., excluding girls) demonstrated similar findings as the whole sample. That is, boys with ASD received lower scores than boys in the TD group on reported emotion regulation skills, reported negative emotionality, and reported social skills). Therefore, although no conclusions can be made due to small sample size when only boys are included, it is possible that the differences found between the ASD and TD groups were due ASD related difficulties.

Thus, future research needs to examine gender differences in emotional development in typical and atypical populations and the selection of an appropriate comparison group. A more appropriate comparison group for this study could have been children with developmental delays (e.g., speech delays), children with Oppositional Defiant Disorder (e.g., Downs & Smith, 2004) or Attention Deficit Hyperactivity Disorder (e.g., Antshel & Remer, 2003; Wakcott & Landau, 2004), who often show difficulties with social skills and emotion regulation. Moreover, it would be helpful for future studies to match groups on gender.

Another consideration is that the TD group demonstrated social skills within the above average range, which also might have influenced current results. Specifically, the TD group scored significantly above the average level of functioning on the Vineland-II; thus, this sample does not match the norm or population sample used in the Vineland-II. As such, the TD group
included in this study might not have been “typical” per se, as their social skills were found to above the general population. However, it is possible that families with children with ASD are more sensitive to reporting atypical behaviors than parents of children with typical developing, who may over report their children’s abilities. Notably, a positive association was found between mental age (MA) and chronological age (CA) in the ASD group, but not in the TD group. These findings suggest that some younger TD children might have scored within the above average level of functioning, which also did not make an appropriately matched group.

Third, only parental report was used to assess emotion regulation, emotionality, and social skills. Including teachers’ report or both parents might help to gain a better understanding of strengths and difficulties across settings in this population. It is important to note that parental report is essential and can be reliable and valid (Rothbart & Bates, 1998, Rothbart & Mauro, 1990). Nonetheless, assessing social skills using one method (i.e., Vineland-II) was also a drawback in this study. Panela (2013) described other approaches to investigate social competence, including assessing specific social skills (e.g., Cavell, 1990), sociometric/popularity (Newcomb, Bukowski, & Pattee, 1993), quality of friendships (Hartup, 1989), and the joined result of back of forth interactions (Rose-Krasnor, 1997). Thus, to obtain a better picture of the role of emotion regulation to social competence, using a multimethod approach is likely to give us a better understanding of how these constructs influence each other.

Fourth, children’s emotion regulation abilities were measured at one time point under restricted laboratory settings. For instance, the observed general negative emotionality was coded for 20 seconds and the observed general positive emotionality for 6 minutes. Thus, this cross-sectional study did not capture how emotion regulation might evolve over time. Also, the skills required to manage the laboratory situations might be different from those needed to handle
situations that are more complex (e.g., interacting with an adult versus a peer). Notably, similar differences have been reported between natural and laboratory settings. Kochanska, Akzan, Penney, and Doobay (2007) reported that positive emotionality in naturalistic settings was associated positively to self-regulation, but in scripted laboratory settings, it was found to be negatively associated to self-regulation. Thus, future research should assess emotion regulation in multiple settings and examine its correlates longitudinally to assess the influence of emotion regulation across time (e.g., with other mental health concerns, best outcomes).

Finally, the emotionality coding did not allow coding for atypical behaviors in the ASD group. For instance, some children demonstrated hand flapping when excited, and that behavior was not coded.

**Concluding Remarks**

Although no conclusions can be drawn about these differences, these findings raised two possibilities regarding emotionality in children with ASD. First, differences in parent-reported emotion regulation suggest that children with ASD might be viewed by their parents as having a poor repertoire of emotion regulation skills. As such, they may not have adequate tools or use them flexibly when dealing with emotionally demanding experiences, as perceived by parents.

Second, differences in parent perceptions of negative emotionality could also indicate that children with ASD have increased reactivity, and thus they might have more to regulate. In other words, it is possible that they experience more intensity of emotion, and they need advanced emotion regulation skills to do so.

The findings that children with ASD tended to experience increased general negative emotionality (i.e., CEIS), but decreased anger and sadness (i.e., ERQ) are not clear. Anecdotally, parents of children with ASD sometimes report that these children appear to show anger, fear, or
sadness by tantruming. As such, future research might need to distinguish how children with ASD tend to manifest their negative reactions to emotionally demanding situations.

In general, prior research has shown that individuals with ASD experience complex difficulties in social and emotional competence, including: impairments in their ability to monitor their behavior (Koegel & Koegel, 1995), to interpret contextual elements of their social environment (Klin, 2000), to use appropriate social skills (Hwang & Hughes, 2000; Rogers, 2000), to identify facial expressions (Schultz, et al., 2003), to understand prosodic elements of speech, the nuances of language, the pragmatics of communication and the interpretations of gestures (Tager-Flusberg, 2003), to take others’ perspectives (Baron-Cohen et al., 2000), to have insight into the emotional components of relationships (Begeer et al., 2008), to regulate their emotions (Konstantareas & Stewart, 2006; Scarpa & Reyes, 2011).

It is estimated that 50-70% of children with ASD experience emotional difficulties (Gadow, DeVincet, Pomeroy, & Azizian, 2004; Tonge & Einfeld, 2003). According to Hepburn and Wolf (2013), a shortcoming of social skills interventions for children with ASD is that they often do not include teaching about emotions, which is essential during social interactions. Addressing difficulties associated with emotional competence might, in turn, facilitate interactions with peers, which might lead to an improved self-esteem, overall well-being, and later adjustment in adolescents with ASD.

Although Kanner and Asperger emphasized deficits in social-emotional development in children with ASD almost 70 years ago, current research on children with ASD and their emotionality and capacity to regulate their emotions is limited. The aim of this study was to investigate the link of social skills to emotional regulation strategies and emotionality in children.
with ASD to obtain a comprehensive view of their social and emotional difficulties. Nonetheless, due to the study’s limitations, no definite conclusions can be drawn.

Cole, Zahn-Waxler, Fox, Usher, and Welsh (1996) highlight the importance of examining differences in emotion regulation that characterized children with other psychopathologies because it provides a comprehensive assessment of child’s strength and difficulties. Thus, studying the emotional regulation in individuals with ASD is, indeed, a fruitful area of research, as these difficulties might be amenable to treatment (Bauminger, 2002; Scarpa & Reyes, 2011; Sofronoff, Attwood, & Hinton, 2005; Sofronoff, Attwood, Hinton, & Levin, 2007). Targeting children’s emotion regulation skills might also have a positive influence in their social competence (Eisenberg, Sadovsky, & Spinrad, 2005).
References


EMOTION REGULATION AND EMOTIONALITY IN CHILDREN WITH ASD


Tables

**Table 1:**
Demographics: Gender, Chronological Age, and Mental Age for the ASD and TD Groups

<table>
<thead>
<tr>
<th></th>
<th>ASD Group (n=12)</th>
<th>TD Group (n=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11 males, 1 female</td>
<td>15 females, 6 males</td>
</tr>
<tr>
<td>Mean in Months (SD), range</td>
<td></td>
<td></td>
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<tr>
<td>Chronological Ages (CA)</td>
<td>71.42 (15.82), 42-94</td>
<td>54.00 (15.79), 36-88</td>
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<td>Mental Age (MA, PPVT-4)</td>
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<td>69.43 (20.51), 39-121</td>
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<tr>
<td>Correlations between CA and MA for each group</td>
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<td>Correlations between CA and MA for the whole sample</td>
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*Note. ASD=Autism Spectrum Disorder. SD=Standard Deviation. **p < .010*
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<tr>
<th>Table 2:</th>
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<td><strong>Descriptive Statistics and Correlations for the Diagnostic Assessment for the ASD Group</strong></td>
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<td>**Autism Diagnostic Observation Schedule (ADOS)**¹</td>
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<td>Communication Domain</td>
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<td>Reciprocal Social Interaction Domain</td>
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<td>Repetitive Restricted</td>
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<td>Severity Score</td>
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<tr>
<td><strong>Correlations between ADOS and CA and MA</strong></td>
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<td>ADOS – Total Score</td>
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<td>ADOS – Severity Score</td>
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*Note. ¹ASD cutoff = 7; Autism cutoff = 10. ASD = Autism Spectrum Disorder. SD = Standard Deviation. CA = Chronological age. MA = Mental age. ¹Severity scores’ descriptors: 1-2 = Minimal-to-mo-evidence, 3-4 = Low, 5-7: Moderate, 8-10: High.*
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Note. ASD = Autism Spectrum Disorders. ERC = Emotion Regulation Checklist. ERQ = Emotion Regulation Questionnaire. CEIS = Children’s Emotional Intensity Scale. ** = p < .01. * = p < .05. NP = non-parametric statistics (i.e., Spearman’s rho).
Table 4: Intercorrelations among Study Measures in the TD Group

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<th>2</th>
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<tbody>
<tr>
<td>ERC-Emotion Regulation subscale</td>
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<tr>
<td>ERQ-Anger Emotionality</td>
<td>.31</td>
<td>.60*</td>
<td>1</td>
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<tr>
<td>ERQ-Fear Emotionality</td>
<td>.01</td>
<td></td>
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<tr>
<td>ERQ-Sadness Emotionality</td>
<td>.40</td>
<td>.37</td>
<td>.56*</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>ERQ-Positive Affect Emotionality</td>
<td>.14</td>
<td>.27</td>
<td>.52*</td>
<td>.60**</td>
<td>1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CEIS-General Positive Emotionality</td>
<td>.54*</td>
<td>.10</td>
<td>-12</td>
<td>.25</td>
<td>-.02</td>
<td>1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CEIS-General Negative Emotionality</td>
<td>-.12</td>
<td>-.51*</td>
<td>-.50*</td>
<td>-.28</td>
<td>-.46*</td>
<td>-.03</td>
<td>1</td>
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<tr>
<td>Observed General Positive Emotionality</td>
<td>.05</td>
<td>-12</td>
<td>.02</td>
<td>-.01</td>
<td>-.18</td>
<td>.33</td>
<td>-.06</td>
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<td></td>
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<tr>
<td>Observed General Negative Emotionality</td>
<td>-.10</td>
<td>-.25</td>
<td>-.02</td>
<td>.11</td>
<td>-.08</td>
<td>.03</td>
<td>.37</td>
<td>.33</td>
<td>1</td>
<td></td>
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<tr>
<td>Quantity-Observed Emotion Regulation Strategies</td>
<td>-.30</td>
<td>-.30</td>
<td>.01</td>
<td>.03</td>
<td>.01</td>
<td>-.11</td>
<td>.21</td>
<td>.06</td>
<td>.46*</td>
<td>1</td>
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<tr>
<td>Quality-Observed Emotion Regulation Strategies (NP)</td>
<td>-.31</td>
<td>.20</td>
<td>-.01</td>
<td>.01</td>
<td>-.33</td>
<td>-.03</td>
<td>.07</td>
<td>.13</td>
<td>.04</td>
<td>.52**</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>ASD Group (n=12)</th>
<th>TD Group (n=21)</th>
<th>Fisher r-z transformation (r comparison between groups)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC Emotion Regulation</td>
<td>.78**</td>
<td>-.01</td>
<td>2.44 (p &lt; .010)</td>
</tr>
<tr>
<td>Observed-General Positive Emotionality</td>
<td>-.10</td>
<td>-.16</td>
<td>0.14 (p = .444)</td>
</tr>
<tr>
<td>Observed-General Negative Emotionality</td>
<td>-.01</td>
<td>-.02</td>
<td>0.02 (p = .492)</td>
</tr>
<tr>
<td>CEIS-General Positive Emotionality</td>
<td>-.35</td>
<td>-.01</td>
<td>-0.82 (p = .206)</td>
</tr>
<tr>
<td>CEIS-General Negative Emotionality</td>
<td>.28</td>
<td>.13</td>
<td>0.36 (p = .359)</td>
</tr>
<tr>
<td>ERQ-Anger Emotionality</td>
<td>.50</td>
<td>.11</td>
<td>1.01 (p = .156)</td>
</tr>
<tr>
<td>ERQ-Fear Emotionality</td>
<td>.56*</td>
<td>.24</td>
<td>0.9 (p = .814)</td>
</tr>
<tr>
<td>ERQ-Sadness Emotionality</td>
<td>.42</td>
<td>.16</td>
<td>0.66 (p = .255)</td>
</tr>
<tr>
<td>ERQ-Positive Affect Emotionality</td>
<td>-.03</td>
<td>.19</td>
<td>-0.51 (p = .305)</td>
</tr>
<tr>
<td>Quantity-Observed Unique Emotion Regulation Strategies</td>
<td>-.13</td>
<td>-.04</td>
<td>-0.21 (p = .417)</td>
</tr>
<tr>
<td>Quality-Observed Unique Emotion Regulation Strategies (NP)</td>
<td>.28</td>
<td>.02</td>
<td>0.66 (p = .250)</td>
</tr>
</tbody>
</table>

Table 6: Mean Differences in Study Measures between the ASD and TD Groups

<table>
<thead>
<tr>
<th>Measures</th>
<th>ASD Group (n=12)</th>
<th>TD Group (n=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ERC-Emotion Regulation**</td>
<td>21.25 (4.48)</td>
<td>27.50 (3.58)</td>
</tr>
<tr>
<td>2. ERQ-Anger Emotionality**</td>
<td>30.58 (2.81)</td>
<td>34.84 (3.95)</td>
</tr>
<tr>
<td>3. ERQ-Fear Emotionality</td>
<td>30.42 (4.96)</td>
<td>32.74 (3.54)</td>
</tr>
<tr>
<td>4. ERQ-Sadness Emotionality*</td>
<td>32.25 (2.45)</td>
<td>35.21 (3.39)</td>
</tr>
<tr>
<td>5. ERQ-Positive Affect Emotionality**</td>
<td>32.50 (4.58)</td>
<td>37.53 (4.72)</td>
</tr>
<tr>
<td>6. CEIS-General Positive Emotionality*</td>
<td>28.67 (4.05)</td>
<td>31.53 (4.31)</td>
</tr>
<tr>
<td>7. CEIS-General Negative Emotionality**</td>
<td>27.17 (4.28)</td>
<td>20.11 (4.51)</td>
</tr>
<tr>
<td>8. Observed General Positive Emotionality</td>
<td>1.76 (.55)</td>
<td>1.61 (.55)</td>
</tr>
<tr>
<td>9. Observed General Negative Emotionality*</td>
<td>1.29 (.40)</td>
<td>1.10 (.26)</td>
</tr>
<tr>
<td>10. Quantity-Observed Emotion Regulation</td>
<td>2.00 (.74)</td>
<td>2.05 (.38)</td>
</tr>
<tr>
<td>Strategies (NP)</td>
<td>3.58 (.78)</td>
<td>3.34 (.58)</td>
</tr>
<tr>
<td>12. Vineland-II-Socialization Domain**</td>
<td>76.36 (15.87)</td>
<td>120.19 (15.26)</td>
</tr>
</tbody>
</table>

Note. ASD = Autism Spectrum Disorders. n = Sample Size. TD = Typically Developing. SD = Standard Deviations. ERC = Emotion Regulation Checklist. ERQ = Emotion Regulation Questionnaire. CEIS = Children’s Emotional Intensity Scale. ** = p < .01. * = p < .05. Underlined Means = higher scores. NP = Nonparametric statistics (Mann-Whitney Test). The whole sample completed these measures unless otherwise specified. *11 participants completed the Vineland-II. **19 participants completed these measures.
Table 7:
Study Measures: Mean Differences between the ASD and TD Boys

<table>
<thead>
<tr>
<th>Measures</th>
<th>ASD Boys (n=11)</th>
<th>TD Boys (n=6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ERC-Emotion Regulation**</td>
<td>20.82 (4.42)</td>
<td>28.00 (2.00)</td>
</tr>
<tr>
<td>2. ERQ-Anger Emotionality</td>
<td>30.82 (2.82)</td>
<td>34.00 (4.08)</td>
</tr>
<tr>
<td>3. ERQ-Fear Emotionality</td>
<td>30.27 (5.18)</td>
<td>31.25 (4.03)</td>
</tr>
<tr>
<td>4. ERQ-Sadness Emotionality</td>
<td>32.27 (2.57)</td>
<td>33.00 (4.40)</td>
</tr>
<tr>
<td>5. ERQ-Positive Affect Emotionality++</td>
<td>32.36 (4.78)</td>
<td>36.75 (2.63)</td>
</tr>
<tr>
<td>6. CEIS-General Positive Emotionality</td>
<td>28.00 (3.49)</td>
<td>29.25 (4.72)</td>
</tr>
<tr>
<td>7. CEIS-General Negative Emotionality*</td>
<td>27.36 (4.43)</td>
<td>22.00 (3.56)</td>
</tr>
<tr>
<td>8. Observed General Positive Emotionality</td>
<td>1.73 (0.57)</td>
<td>1.39 (0.33)</td>
</tr>
<tr>
<td>9. Observed General Negative Emotionality</td>
<td>1.32 (0.40)</td>
<td>1.08 (0.20)</td>
</tr>
<tr>
<td>10. Quantity-Observed Emotion Regulation</td>
<td>2.00 (0.80)</td>
<td>2.00 (0.00)</td>
</tr>
<tr>
<td>11. Quality-Observed Emotion Regulation (NP)</td>
<td>3.55 (0.80)</td>
<td>3.00 (0.00)</td>
</tr>
<tr>
<td>12. Vineland-II-Socialization Domain**</td>
<td>75.70 (16.57)</td>
<td>118.67 (21.30)</td>
</tr>
</tbody>
</table>

Note. ASD = Autism Spectrum Disorders. n = Sample Size. TD = Typically Developing. SD = Standard Deviations. ERC = Emotion Regulation Checklist. ERQ = Emotion Regulation Questionnaire. CEIS = Children’s Emotional Intensity Scale. ** = p < .001. *= p < .05. += p = .054. +++= p = .055 Underlined Means = higher scores. NP = Nonparametric statistics (Mann-Whitney Test). The whole sample completed these measures unless otherwise specified. To participants completed the Vineland-II. 34 participants completed these measures.
Figure

Figure 1:
Percentage of Emotional Regulation Strategies Used by the TD and ASD Groups

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doing Nothing</td>
<td>30 (ASD)</td>
</tr>
<tr>
<td>Self-Distraction</td>
<td>45 (ASD)</td>
</tr>
<tr>
<td>Directing Situation</td>
<td>50 (TD)</td>
</tr>
<tr>
<td>Engaging in Alt. Activity</td>
<td>20 (ASD)</td>
</tr>
<tr>
<td>Complying</td>
<td>90 (ASD)</td>
</tr>
</tbody>
</table>

ASD

TD
Appendix

Appendix A: General Positive and Negative Emotionality Coding

*General Instructions:* Children’s emotionality is to be coded no matter what they do, no matter what they are playing with, and no matter what they pay attention to, as long as the adult brings out the remote control toy.

**Making a Shirt Task: General Positive Emotionality**

*Instructions:* Child’s positive emotionality is to be coded for 6 minutes (12 thirty-second epochs) from previously recorded videos. An average score is to be computed from the 12 epochs. Please assign one of the following scores.

1 = No positive emotion observed

2 = Low intensity smile – a small smile or positive vocalization

3 = Moderate intensity smile or more prolonged low intensity smile. May include positive vocalization

4 = Intense smile, laughter, or prolonged smiles. May include positive vocalizations (squealing)

999 = not codable (e.g., could not see child)

**Brief Play with Remote Control Task: General Negative Emotionality**

*Instructions:* Child’s negative emotionality is to be coded for 20 seconds from previously recorded videos. Please assign one of the following scores.

1 = No negative emotion observed

2 = Low intensity negative emotion. Mild, vague or very brief facial expression of negative emotion, or negative tone

3 = Moderate negative emotion. Moderate intensity negative emotion, more prolonged mild facial expression of negative emotion or negative tone

4 = Intense negative emotion. Intense or prolonged facial negative emotion. Clearly seems upset. May include negative tone about feeling negative for prolonged period or crying

999 = not codable (e.g., could not hear video)
Appendix B: Emotion Regulation Strategies Coding

*General Instructions:* Children’s emotional regulation strategies are to be coded no matter what they do, no matter what they are playing with, and no matter what they pay attention to, as long as the adult is able to take or try to take away the toy from the child.

**Brief Play with Remote Control Task: Emotion Regulation Strategies**

*Instructions:* Children’s emotional regulation strategies are to be coded for 10 seconds from previously recorded videos after the examiner finished the sentence, “I need to take it back.” One of the following scores is to be assigned every time each behavior is observed (Grolnick et al., 1996).

1 = doing nothing
2 = self-distraction (e.g., playing with their garment)
3 = directing situation (e.g., saying, “I will play for a little bit more”)
4 = engaging in alternative activities (e.g., playing with other toys/manipulating other objects)
5 = complying (e.g., give the toy to the examiner immediately)
999 = not codable (e.g., poor camera view, sound quality)
Appendix C: Institutional Review Board Approval Letter

MEMORANDUM

DATE: March 15, 2012

TO: Angela Scarpa-Friedman, Nuri Reyes

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)

PROTOCOL TITLE: Children with Autism and Their Regulation of Emotions (CARE study)

IRB NUMBER: 11-989

Effective March 12, 2012, the Virginia Tech Institutional Review Board, at a convened meeting, approved the amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: Full Board Review
Protocol Approval Date: 1/11/2012
Protocol Expiration Date: 1/10/2013
Continuing Review Due Date*: 11/26/2012

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federally regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.
<table>
<thead>
<tr>
<th>Date*</th>
<th>OSF Number</th>
<th>Sponsor</th>
<th>Grant Comparison Conducted?</th>
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</table>

*Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

cc: File
Department Reviewer: David W. Harrison
Appendix D: Institutional Review Board Consent Form-TD group

ID ____________

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

CONSENT TO PARTICIPATE IN RESEARCH AND PARENT PERMISSION FORM

TITLE: Children and their Regulation of Emotions (CARE Study)

I. The Purpose of this Research/Project
You and your child have been invited to participate in a research study conducted by Angela Scarpa, Ph. D. and Nuri Reyes, M.S. from the Department of Psychology at Virginia Polytechnic Institute and State University. You and your child were selected as possible participants because your child is between 3 and 7 years of age. Your participation is voluntary and you can choose to withdraw at any time during this session.

Early childhood is a time of change in the development of emotional competence. The purpose of this study is to investigate how children manage emotional states. We are also interested in investigating parent-child interactions during routinely/everyday events (e.g., reading a book). This investigation will contribute to the field of emotions and emotion regulation by increasing current understanding of emotional developmental in young children.

II. Procedures

Overview
The study’s session will last approximately 1 to 1 hour and 1/2 hour with breaks. If you decide to participate in this study, you and your child will be asked to do the following:

- Parent will be asked to complete questionnaires about their child’s socio-emotional information and family’s demographic information
- Child will be administered a cognitive assessment and will participate in four observational tasks (i.e., playing briefly with an attractive remote control toy, decorating a shirt, and observing the examiner (1) dropping pens/pencils onto the floor and (2) getting a paper cut)
- Parent and child will be asked to interact together during a book reading task

Parents’ forms and questionnaires about your child

- Child Information Form asks you questions about child and family demographic information and the child’s developmental, social, behavioral, and medical history
- Emotion Regulation Checklist asks you to rate how often your child exhibits different emotional states
- The Children’s Behavior Questionnaire assesses children’s temperament and attention abilities
- Emotion Questionnaire asks you to indicate your child’s ability to deal with demanding situations
- Children’s Emotional Intensity Scale examines children’s typical emotional reactions to daily events
- Vineland Adaptive Behavior Scales asks you about your child’s ability to interact with others during social situations
- Social Communication Questionnaire asks you questions regarding your child’s social and play behaviors
- Social Responsiveness Scale will asks you to rate your child’s social understanding and social behaviors
- Sensory Experiences Questionnaire assesses young children’s everyday responses to sensory input (e.g., tactual, visual, and auditory)
- Strengths and Difficulties Questionnaire assesses children’s emotional and behavioral responses to people, situations, and objects during everyday situations
- Behavior Rating Inventory of Executive Function (BRIEF) asks you to describe your child’s behavioral and emotional regulation abilities

Child’s assessments and tasks:

- Your child will be administered The Peabody Picture Vocabulary Test, 4th Edition (PPVT-4). This cognitive test assesses children’s current verbal abilities. During this test, children are shown pictures of common objects and are asked to point to the pictures stated by the examiner.
- Your child will participate in the “making a t-shirt,” “brief time play,” “dropped pencils/pens,” and “paper cut” tasks. These tasks are often used with young children to assess their emotional responses to positive and negative events and prosocial behaviors. That is, during the “making a t-shirt” task, your child’s positive emotionality will be recorded; similarly, during the “brief time play” task, your child’s negative emotional responses will be recorded after a toy is briefly taken from him/her. During the “dropped pencils/pens” and “paper cut” tasks, your child’s reactions to these events will be recorded.

Virginia Tech Institutional Review Board Project No. 11-989
Approved March 12, 2012 to January 10, 2013
Parent-child interaction task:
You and your child will be asked to sit comfortably on a chair or sofa. You will be asked to read a picture book to your child, as you would usually do at home. You will be shown the book before the task, so that you can review it. All parents will read the same book to their children.

III. Potential Risks
There are no more than minimal risks involved for you and your child to participate in this study. Some of the potential risk includes:

- Children might become tired and/or bored as the study protocol progresses, but they will be allowed to take breaks and small snacks will be offered to them and their parents.
- Children might become upset when the brief play time task is administered. To minimize negative emotionality that the child may experience, other toys will be placed in the room, so that he/she can play and explore those toys after the toy car is taken away.
- Children might become uncomfortable and upset when observing others dropping the pencils/pens onto the floor and getting a paper cut. To minimize these feelings that the child could experience, he/she will be assured that everything is fine and that the examiner is OK after the each task.
- Parents might feel anxious about their child’s performance; however, parents are encouraged to ask any questions about the assessments and study’s protocol.
- Also, parents may feel uncomfortable about being videotaped, but only people involved with the study will watch the video recordings for coding purposes.
- The investigators are also obligated to report suspicions of child maltreatment, suicidality, or homicidality to appropriate authorities (either police or Child Protective Services), upon which a legal investigation would occur.

IV. Potential Benefits of this Project to Subjects and/or Society
Parents will receive a brief report that will include their child’s performance on the Peabody Picture Vocabulary Test, 4th Edition (PPVT-4) and their developmental level on the Social domain of the Vineland Adaptive Behavior Scales, 2nd Edition (Vineland-II). This brief report will provide the parents information about their child’s expressive language abilities and social development. No other benefits are anticipated.

Regarding benefits to society, the findings in this study may further current knowledge and understanding of children’s emotional competence and its role in their social abilities, temperamental profiles, and sensory difficulties in both typically developing children and children with autism. The study could ultimately contribute to the scientific literature on autism and to the autism community.

V. Extent of Anonymity and Confidentiality
All information obtained during this study that can be identified with you or your child will remain confidential and will be disclosed only with your permission or as required by law. However, confidentiality must be broken during the following situations (1) if a previously unreported incident of child abuse is known or strongly suspected or (2) if a participant is believed to be a threat to himself/herself or others. Thus, if any of these situations would arise, the investigator must notify appropriate authorities, and you will be informed of the need to report. The authorities would be provided the information about the possibility of harm to the child or others that was obtained during the study.

All the questionnaires, forms, and videotapes obtained from you and your child will be assigned an ID number, and only this number will be used on your data. A key linking your number with a name will be kept in a locked file cabinet in a locked office at the Virginia Tech Autism Clinic. Moreover, your or your child’s information, including forms, questionnaires, and videotapes that has a name or code on it will be kept in locked file cabinet. Only the study’s research team will have access to this information. At any time, will information obtained from this study be released to anyone without your written consent, except under the conditions noted above. Results may be published or presented for scientific purposes, but your or your child’s identity will not be revealed in any description or publication of this research.

If my child or I participate in other studies affiliated with VTAC, our data will be given a code and potentially combined with our other coded data. A master list will be maintained in order to match our current data with previously collected data. Our names from this master list will only be available to VTAC staff and will not be shared with others. I may be contacted for future studies if I give separate permission below.

Virginia Tech Institutional Review Board Project No. 11-989
Approved March 12, 2012 to January 10, 2013
VI. Compensation
Your participation is completely voluntary. You will receive a compensation of $30 for participating in this study; you will receive this payment even if you decide to withdraw from study.

VII. Freedom to Withdraw
You can choose to participate and be part of this study or not. If you volunteer to be in this study, you are free to withdraw yourself and your child from this study at any time without penalty or consequences of any kind. Parents and children have the right to refuse to answer any questions or to do any task that are part of this study, and continue in the study without any penalties. There may be times that the investigator determines that you or your child cannot continue in the study. In these cases, you will be notified and the session will end.

VIII. Approval of Research
This project has been approved, as required, by the Institutional Review Board (IRB) for Research Involving Human Subjects and the Department of Psychology at Virginia Polytechnic Institute and State University.

IX. Parent’s Responsibilities
I give my consent for myself and permission for my child to participate in this study. I have the following responsibilities: to complete questionnaires about my child’s development and participate in an interaction with my child, and my child will be given cognitive and observational assessments to evaluate their language development and emotional responses. I agree to allow the sessions to be videotaped.

X. Permission
I have read the preceding Consent and Permission Form and conditions of this project, or it has been read to me. I understand its contents and what is expected of myself and my child. My questions about the study have been answered to my satisfaction. After signing the consent form, I understand that my child and myself can withdraw at any time without penalty. Thus, I give my voluntary consent to participate in this study and give permission for my child’s participation.

XI. Identifications of Investigators
I understand that a signed copy of the consent/permission form will be given to me and if I have any questions or concerns about this study, I can contact the Principal Investigator, Angela Scarpa, Ph.D. at ascarpa@vt.edu or (540) 231-2615, or the co-investigator, Nuri Reyes, M.S. at reinsid@vt.edu or (540) 231-2053, Department of Psychology, Virginia Polytechnic Institute and State University.

XII. Right of Research Subjects
You can choose to withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, you can contact the Dr. David W. Harrison from the Psychology Human Subjects Committee at (540) 231-4422 or Dr. David M. Moore, Chair of the Institutional Review Board, Research Division, at (540) 231-4991.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

I have read and discussed this document with the researchers, and have had my questions answered. I agree to voluntarily participate in this study. I understand that I can withdraw at any time after signing this consent form.

Child’s name (Printed)  Parent/Guardian’s Name (Printed)  Parent’s/Guardian’s Signature  Date

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Appendix E: Institutional Review Board Consent Form-ASD group

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VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

CONSENT TO PARTICIPATE IN RESEARCH AND PARENT PERMISSION FORM

TITLE: Children with Autism and their Regulation of Emotions (CARE Study)

I. The Purpose of this Research/Project

You and your child have been invited to participate in a research study conducted by Angela Scarpa, Ph. D. and Nuri Reyes, M.S. from the Department of Psychology at Virginia Polytechnic Institute and State University. You and your child were selected as possible participants because your child is between 3 and 7 years of age and has received a diagnosis of Autism Spectrum Disorder (i.e., Autism, Asperger’s, Pervasive Developmental Disorder-Not Otherwise Specified). Your participation is voluntary and you can choose to withdraw at any time during this session.

Children with autism tend to experience difficulty managing their emotional states. Thus, the purpose of this study is to investigate how children with autism manage emotional states. We are also interested in investigating parent-child interactions during routine everyday events (e.g., reading a book). This investigation will contribute to the field of emotions and emotion regulation by increasing current understanding of emotional developmental in young children with autism.

II. Procedures

Overview

The study’s session will last approximately 1 and 1/2 to 2 hours with breaks. If you decide to participate in this study, you and your child will be asked to do the following:

- Parent will be asked to complete questionnaires about their child’s socio-emotional information and family’s demographic information
- Child will be administered a cognitive and diagnostic assessments and will participate in four observational tasks (i.e., playing briefly with an attractive remote control toy, decorating a shirt, and observing the examiner (1) dropping pens/pencils onto the floor and (2) getting a paper cut)
- Parent and child will be asked to interact together during a book reading task

Parents’ forms and questionnaires about your child

- Child Information Form asks you questions about child and family demographic information and the child’s developmental, social, behavioral, and medical history
- Emotion Regulation Checklist asks you to rate how often your child exhibits different emotional states
- The Children’s Behavior Questionnaire assesses children’s temperament and attention abilities
- Emotion Questionnaire asks you to indicate your child’s ability to deal with demanding situations
- Children’s Emotional Intensity Scale examines children’s typical emotional reactions to daily events
- Vineland Adaptive Behavior Scale asks you about your child’s ability to interact with others during social situations
- Social Communication Questionnaire asks you questions regarding your child’s social and play behaviors
- Social Responsiveness Scale will ask you to rate your child’s social understanding and social behaviors
- Sensory Experiences Questionnaire assesses young children’s everyday responses to sensory input (e.g., tactile, visual, and auditory)
- Strengths and Difficulties Questionnaire assesses children’s emotional and behavioral responses to people, situations, and objects during everyday situations
- Behavior Rating Inventory of Executive Function (BRIEF) asks you to describe your child’s behavioral and emotional regulation abilities

Child’s assessments and tasks:

- Your child will be administered The Peabody Picture Vocabulary Test, 4th Edition (PPVT-4). This cognitive test assesses children’s current verbal abilities. During this test, children are shown pictures of common objects and are asked to point to the pictures stated by the examiner.
- Your child also will be administered the Autism Diagnostic Observation Schedule (ADOS). The ADOS is a 45-minute diagnostic observation designed to assess deficits associated with Autism Spectrum Disorders in various domains: Communication, and Reciprocal Social Interaction, as well as Stereotyped Behaviors, Restricted Interests and Imaginative and Creative play. During this diagnostic assessment, your child will be presented with play like activities and games in order to probe for a social interchange between the child and the examiner.
- Your child will participate in the “making a t-shirt,” “brief time play,” “dropped pencils/pens,” and “paper cut” tasks. These tasks are often used with young children to assess their emotional responses to positive and negative events and prosocial behaviors. That is, during the “making a t-shirt” task, your child’s positive emotionality will be recorded; similarly, during the “brief time play” task, your child’s negative emotional responses will be recorded after a toy is

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briefly taken from him/her. During the "dropped pencils/pens" and "paper cut" tasks, your child’s reactions to these events will be recorded.

Parent-child interaction task:  
You and your child will be asked to sit comfortably on a chair or sofa. You will be asked to read a picture book to your child, as you would usually do at home. You will be shown the book before the task, so that you can review it. All parents will read the same book to their children.

III. Potential Risks
There are no more than minimal risks involved for you and your child to participate in this study. Some of the potential risk includes:

- Children might become tired and/or bored as the study protocol progresses, but they will be allowed to take breaks and small snacks will be offered to them and their parents.
- Children might become upset when the brief play time task is administered. To minimize negative emotionality that the child may experience, other toys will be placed in the room, so that he/she can play and explore those toys after the toy car is taken away.
- Children might become uncomfortable and upset when observing others dropping the pencil/pens onto the floor and getting a paper cut. To minimize these feelings that the child could experience, he/she will be assured that everything is fine and that the examiner is OK after the task.
- Parents might feel anxious about their child’s performance; however, parents are encouraged to ask any questions about the assessments and study’s protocol.
- Also, parents may feel uncomfortable about being videotaped, but only people involved with the study will watch the video recordings for coding purposes.
- The investigators are also obligated to report suspicions of child maltreatment, suicidality, or homicidality to appropriate authorities (either police or Child Protective Services), upon which a legal investigation would occur.

IV. Potential Benefits of this Project to Subjects and/or Society
Parents will receive a brief report that will include their child’s performance on the Peabody Picture Vocabulary Test, 4th Edition (PPVT-4) and their developmental level on the Social domain of the Vineland Adaptive Behavior Scales, 2nd Edition (Vineland-II). This brief report will provide the parents information about their child’s expressiveness language abilities and social development. No other benefits are anticipated.

Regarding benefits to society, the findings in this study may further our knowledge and understanding of children’s emotional competence and its role in their social abilities, temperamental profiles, and sensory difficulties in both typically developing children and children with autism. The study could ultimately contribute to the scientific literature on autism and to the autism community.

V. Extent of Anonymity and Confidentiality
All information obtained during this study that can be identified with you or your child will remain confidential and will be disclosed only with your permission or as required by law. However, confidentiality must be broken during the following situations (1) if a previously unreported incident of child abuse is known or strongly suspected or (2) if a participant is believed to be a threat to himself/herself or others. Thus, if any of these situations would arise, the investigator must notify appropriate authorities, and you will be informed of the need to report. The authorities would be provided the information about the possibility of harm to the child or others that was obtained during the study.

All the questionnaires, forms, and videotapes obtained from you and your child will be assigned an ID number, and only this number will be used on your data. A key linking your number with a name will be kept in a locked file cabinet in a locked office at the Virginia Tech Autism Clinic. Moreover, your or your child’s information, including forms, questionnaires, and videotapes that has a name or code on it will be kept in locked file cabinet. Only the study’s research team will have access to this information. At no time, will information obtained from this study be released to anyone without your written consent, except under the conditions noted above. Results may be published or presented for scientific purposes, but your or your child’s identity will not be revealed in any description or publication of this research.

If my child or I participate in other studies affiliated with VTAC, our data will be given a code and potentially combined with our other coded data. A master list will be maintained in order to match our current data with previously collected data. Our names from this master list will only be available to VTAC staff and will not be shared with others. I may be contacted for future studies.

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if I give separate permission below.

___ Yes, I would like to be contacted for possible participation in future studies. I understand I would be under no obligation to participate in these studies if contacted. I can decide at that time if I would like to participate.

VI. Compensation
Your participation is completely voluntary. You will receive a compensation of $30 for participating in this study; you will receive this payment even if you decide to withdraw from study.

VII. Freedom to Withdraw
You can choose to participate and be part of this study or not. If you volunteer to be in this study, you are free to withdraw yourself and your child from this study at any time without penalty or consequences of any kind. Parents and children have the right to refuse to answer any questions or to do any task that are part of this study, and continue in the study without any penalties. There may be times that the investigator determines that you or your child cannot continue in the study. In these cases, you will be notified and the session will end.

VIII. Approval of Research
This project has been approved, as required, by the Institutional Review Board (IRB) for Research Involving Human Subjects and the Department of Psychology at Virginia Polytechnic Institute and State University.

IX. Parent’s Responsibilities
I give my consent for myself and permission for my child to participate in this study. I have the following responsibilities: complete questionnaires about my child’s development and participate in an interaction with my child, and my child will be given cognitive, diagnostic, and observational assessments to evaluate their language development, autism related behaviors, and emotional responses. I agree to allow the sessions to be videotaped.

X. Permission
I have read the preceding Consent and Permission Form and conditions of this project, or it has been read to me. I understand its contents and what is expected of me and my child. My questions about the study have been answered to my satisfaction. After signing the consent form, I understand that my child and myself can withdraw at any time without penalty. Thus, I give my voluntary consent to participate in this study and give permission for my child’s participation.

XI. Identification of Investigators
I understand that a signed copy of the consent/permission form will be given to me and if I have any questions or concerns about this study, I can contact the Principal Investigator, Angela Scarpa, Ph.D. at ascarpa@vt.edu or 540-231-2615, or the co-investigator, Nuri Reyes, M.S. at reynados@vt.edu or 540-231-2053, Department of Psychology, Virginia Polytechnic Institute and State University.

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