EMOTION REGULATION ASSESSMENT FOR AUTISM SPECTRUM DISORDER:

AN OBSERVATION-BASED MEASUREMENT

OF AFFECTIVE BEHAVIORS

by

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ABSTRACT

Emotion regulation (ER) in Autism Spectrum Disorder (ASD) is frequently identified as source of concern for ASD children within clinical treatment settings, but is rarely the primary research focus of clinical studies. Process-based theories of ER are common in literature based on typical development but have yet to be scientifically examined within atypical populations. The current study introduces the Emotion Regulation Assessment for Autism (ERAA) as an ASD-specific clinical measure of ER skills. The ERAA is based on existing, process-based theories of ER. ER difficulties in ASD are problematic for clinicians and families. The existence of an ASD-specific measure of emotion regulation may assist in intervention planning to prevent regulatory difficulties later in life. Participants include 31 children with ASD and 31 children with a history of typical development, all between 24 and 36 months of age. Children are observed in 15-minute, structured play samples with both a parent and a stranger. Play observations are recorded and reviewed by blind observers who provide behavioral codes via the ERAA and other behavioral coding schemas. ERAA codes are assessed across varying styles of play and partners (i.e., independent vs. joint-interactive style of play; stranger vs. parent). Additional information is collected via parent report and developmental assessments by a clinician. Primary analyses show reliable use of the ERAA by blind coders and significantly higher scores of ER difficulties within the ASD sample than in the sample with typical development. Within both samples, play context produces a notable difference in ER skills, as independent play shows participants having more difficulty with ER than either joint-interactive play or disruptive play. Secondary analyses support the utility of the ERAA as being a unique

measure of ER for children with ASD. The assessed symptoms of ER difficulty on the ERAA appear to be separate from the traditional ASD symptoms but also distinct from traditional symptoms of ER. The results of the current study have important implications for assessing and treating ER difficulties in ASD, but are also indicative of future areas of ASD research, such as dysregulation during independent play.

DEDICATION

This dissertation is dedicated to my grandmother, Georgia Blair, whose lifelong work with children was the inspiration for my career pursuits.

LIST OF ABBREVIATIONS AND SYMBOLS

df	Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data
F	Fisher's *F* ratio
M	Mean: the sum of a set of measurements divided by the number of measurements in the set
SD	Standard deviation
n	Number in sample
p	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
r	Pearson product-moment correlation
t	Computed value of *t*-test
S	Skewness
K	Kurtosis
<	Less than
η^2_p	Partial Eta Squared; a measure of effect size or strength of relationship

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INTRODUCTION

Emotion Regulation Assessment for Autism Spectrum Disorder: An Observation-Based Measurement of Attention, Arousal, and Affective Behaviors

Emotion modification and regulation are a set of skills that begin formation early in life. Prenatal studies on anxiety show that biological reactions are beginning to occur in response to the environment, indicating early distress and emotional reactivity (Davis, Snidman, Wadhwa, Glynn, Schetter, & Sandman, 2004; Monk, Myers, Sloan, Ellman, & Fifer, 2003). Following birth, infants are able to communicate their distress through the communicative act of crying, which provides a signal for social attention leading to the provision of basic needs. Parents respond to the signals of distress through physical presence, tactile objects (e.g., food) and intimate touch (Acebo & Thoman, 1995; Gustafson & Harris, 1990). Infants associate the meeting of basic needs with a parent's social presence (i.e., baby is distressed; mother engages; baby is no longer distressed). As cognitive skills increase, the infant is able to practice and learn strategies for soothing or calming independently, in the absence of the parent, and is therefore learning the skills necessary for emotion regulation (Kopp, 1989; Morris, 2009; Spinrad, Stifter, Donelan-McCall, & Turner, 2004).

The above description of an infant's development of emotion regulation indicates how children with typical development acquire the necessary skills to calm and soothe independently. However, not all developmental trajectories follow the same sequence of steps and there are instances where emotion regulation development may go awry. While a young infant may be

learning that his mother's presence is associated with the meeting of his physical needs, the lack of learning may not be marked by signs that are easily measured by a blind observer. Instead, the first observable sign that the child's emotion regulation development may be dysfunctional may not occur until the early toddler years when the child is notably withdrawn or inconsolable. The behaviors in the early toddler years can be the earliest signs that the child is struggling with the regulation of his or her own emotions but these behaviors are not well understood. The present study aims to introduce a measure designed to target emotion regulation skills early in development, and to explore the relationship between emotion regulation and autism spectrum disorder (ASD). A process-based theory will inform the assessment of behaviors related to emotion regulation.

Theories of Emotion Regulation

Emotion regulation is a complex topic, as many theories exist to explain its occurrence. Primary theories of emotion regulation describe the process as either single-factor or multi-factor. Early theories describe emotion regulation as a single-factor process that involved an automatic, biological or physiological reaction to a significant stimulus (James, 1884, 1894; Gross, 1998). More recent research has expanded the single-factor theory of emotion regulation into multi-step models (Campos, Frankel, & Camras, 2004; Cole, Martin, & Dennis, 2004; Gross & Thompson, 2007). For example, a toddler notices that she is bored and begins to look for stimulation, such as playing with a toy truck, to remove the emotion of boredom. The emotion regulation of the toddler involves more than one step: 1) she experiences the emotion of boredom; 2) she looks for a toy; 3) she identifies a truck; 4) she begins to play with the truck; 5) she feels a happy emotion.

Two-Factor Model. Cole's *two-factor* model indicates that the production of an emotion (*factor one*) goes on to produce a behavioral or cognitive reaction that may or may not be observable (*factor two*) (Cole et al., 2004). The model proposed by Cole and colleagues (2004) is presented in Figure 1a. For example, a boy is playing with a truck and this truck is suddenly taken from him by another child. The two-factor approach stipulates that the child will first feel angry (*factor one*), and then act to resolve that anger (*factor two*; e.g., crying, fighting, etc.). An adaptation of the two-factor approach has been expanded by Campos and colleagues (2004) by stipulating that while the two-factor approach presented by Cole et al. (2004) is accurate, it may be improved by expansion. Compos et al. (2004) expand the two-factor model by suggesting a cyclical model of experienced emotions and behavioral reactions that may or may not be observable or reportable by the participant (Figure 1b). In the previous example of the boy and the stolen truck, the expanded model suggests the following example:

> The boy may first feel angry, and then look to see if the other child is playing with his truck. If the other child is happily playing with the truck, the boy will feel jealous. Next, the boy may look to see if any adults are around. If not, the boy may experience anger again, leading him to walk over and push the other child to reclaim the truck.

In the modified model of Campos et al. (2004), the boy uses a sequence of cognitive reactions and emotions to regulate the level of anger that he feels.

The current study is consistent with the modified theory of Campos and colleagues by defining emotion regulation as a process of the human system to maintain functionally adaptive states of arousal through changes in behavior. The regulatory process is explored using both typical and atypical populations.

The Modal Model of Emotion Regulation

Eisenburg and colleagues (2000; Fitzgerald, Barnes, & Almerigi, 2007) place emotion regulation underneath an umbrella term of self-regulation. Self-regulation encompasses the interacting processes of behavioral regulation (i.e., observable states) and emotion regulation (i.e., unobservable states). The relationship between behavioral and emotional regulation is a multi-step process, leading to a final observable emotional state. Gross and Thompson (2007) elaborate the multistep model by introducing the *modal model* of emotion regulation (see Figure 2). The modal model of ER is broken down into the following steps: 1) situation selection; 2) situation modification; 3) attention deployment; 4) cognitive change; 5) and response modulation (Gross, 1998; Gross & Thompson, 2007). The final step of the model (response modulation) is the observable emotion or behavior.

The modal model proposes that the core features of emotion regulation are based on a "person-situation transaction". The transaction directs attention and leads to appropriate or inappropriate responses (Gross & Thompson, 2007; Koole, 2009). Returning to the example of the boy and the toy truck, when the truck is taken away, the removal of the toy may induce feelings of sadness resulting in a tantrum. Using the modal model of emotion regulation, the boy must choose to either continue focusing his attention on the removed toy, or shift attention to a new toy (i.e., attention deployment). The boy's attention shift to a new toy induces a cognitive change (i.e., interest in a new object), leading to a modulated response (i.e., the boy is happy, as opposed to tantruming). In contrast, if the boy had not shifted attention to a new toy, he would not have achieved the cognitive change of desiring a new toy and his response would not be modulated. The boy would continue to desire the removed toy and proceed to tantrum. The shifting of attention in the presence of difficult emotions can be conscious or unconscious. The

conscious/unconscious shifting of attention may be closely related to the concept of explicit versus implicit processes (Lemerise & Arsenio, 2000; Roseman & Evdokas, 2004; Scherer, 2005).

The Need for a Modal Model: Why it is Adaptive. The example of the boy and the truck represents a situation where a child must modulate his or her behavior in the presence of negative or unwanted circumstances (i.e., he wanted his truck and couldn't have it). Emotion regulation skills are necessary in positive contexts, as well as negative contexts. For example, a girl is having a birthday party and is excited to be opening presents. The excitement and crowd of people may over-stimulate her regulatory system and produce excessive energy. The girl must choose to either continue escalating in excitement or focus her attention on something calming, like the parts to a new toy or having her picture taken (i.e., situation modification). The attention shift to aspects of a new toy may induce a cognitive change that decreases the accelerating adrenaline and leads to a more modulated response (i.e., feelings of calm). If this attention shift does not occur, the girl may continue to accelerate in excitement and become uncomfortable or upset. A similar progression occurs within Autism Spectrum Disorder (ASD) when individuals are placed in overly exciting and positive situations, such as an amusement park or party. The escalating arousal results in a cognitive change, thus effecting behavior.

The general theory of shifting to a new emotion in the face of significantly high or low arousal describes an adaptive function (Koole, 2009; Izard, Stark, Trentacosta, & Schultz, 2008; Thompson, 1994). For example, if a person's arousal level is too high to fall asleep at night, that person may need to shift the focus of attention to something calming, such as reading a book, to lower the affective state of arousal. Conversely, if a person's arousal level is too low to complete a homework assignment, that person may need to shift the focus of attention to another

activity, such as going for a run, in an effort to raise the affective state of arousal. The shifting of focus due to heightened arousal is effortful at first, but becomes automatic over time.

Relation to Automatic Regulatory Processes. Automatic actions occur due to previous experiences that are stored in implicit memory (i.e., automatic memory). Implicit memory makes extensive and logical situation appraisal less important and instead relies on core features of a situation to stimulate an automatic or subconscious response (Ekman, 1992; Reber, 1989; Sun, Slusarz, Terry, 2005). For example, when a 12-month old child is learning to walk, this may require significant and explicit focus to make each movement and avoid obstacles. As the child develops and repeats the sequence of walking, the movement becomes automatic and occurs without explicit focus. The method of walking and avoiding obstacles becomes an implicit process. In addition to walking, processes that are difficult to assess in adult populations may be more easily assessed in toddler populations, as many of these implicit processes have not developed into sophisticated, subtle strategies. For example, if someone takes a favorite object away from an adult, an adult will know that screaming will not fix the situation and will instead choose to use their words or actions. Toddlers have not yet learned this automatic logic and their implicit process is to scream. Young children are required to exert effortful and explicit practice toward using their words as opposed to screaming.

Children explicitly practice new behaviors across development and learn that their initial responses may not result in the best outcome. The progression from scream to words demonstrates the rapid development that toddlers make as they learn to react to challenging situations. The toddler years are a prime opportunity to observe the dysfunction of the emotion regulation process before the dysfunctional process becomes automatic in the older years. Once developed, the dysfunctional process will exist as a sophisticated, regulatory strategy.

Development of the Emotion Regulation Process

Emotion regulation is described as a "deliberate, effortful process that seeks to override people's spontaneous emotional responses," (Koole, 2009). Regulatory strategies are observed in adults and practiced by the child in an explicit way before the strategies become effortless and intuitive (i.e., implicit). Children are not born with the necessary skills to effectively and, even with deliberate effort, navigate the steps of Gross and Thompson's modal model (2007). The skills of the model are initially executed in an effortful manner and slowly become more effortless and automatic (Gombert, 1993; Karmiloff-Smith, 1986).

Tacit Metacognition. Tacit metacognition is based on implicit and rule-based decision making, without supportive reasoning based on logic (Schraw & Moshman, 1995; Moore & Frye, 1991). The "rules" of tacit metacognition may be false or illogical. Informal metacognitive processes have some aspect of logic and the concept of true versus false has emerged. The informal process begins to solidify around 4 years of age, with logic-based decisions rarely observed prior to its development. Most decisions prior to age 4 are based on tacit metacognition. Prior to age 4, the behavioral actions used to achieve a specific goal may not be evident to a blind observer prior to four years of age. For example, it may not make logical sense to a blind observer that screaming will result in recovering a stolen toy.

Most intentional actions are goal-directed and problem-solving oriented prior to three years of age, but not necessarily suited to the task or problem at hand (Hay & Cook, 2007; Rheingold, 1982). The description of actions not suited to the task at hand fits well with the more tacit state of metacognition, as most of these actions are based on implicit thought and do not make logical sense for the given task. For example, returning to the example of the boy and the stolen truck, he may react by screaming. Screaming is fitting with tacit cognitions, as the boy

would illogically act on his emotions without logical planning of the end goal (i.e., screaming may lead to time-out). Informal metacognition would direct alternative behaviors, as screaming does not communicate "my truck was stolen" to others but communicates poor behavior, instead.

Assessing the Environment. Reich, Oser, and Valentine (1994) relate the informal metacognitive process to emergent theory of mind and engagement in the surrounding environment (i.e., assessing the environment during troublesome moments). The process of environment assessment is the primary step leading to cognitive change within the modal model. The cognitive change may either be based in tacit or informal metacognition, but is largely the result of environmental assessment (i.e., attention deployment). The boy with the stolen truck may decide to switch to a new activity based on logic (i.e., "I can't get my truck back, so I might as well play with something else"), or he may switch to a new activity based on implicit awareness of discomfort (i.e., "I'm upset; I need a new toy").

Relationship to Executive Function. Metacognition and executive function are closely related and it may be argued that one leads to the other, but neither should be confused with the other. Early in toddlerhood, the mature form of metacognition is evolving from pre-existing executive function skills. Fernandez-Duque, Baird, and Posner (2000) describe the close relationship between metacognition and executive function, stipulating that executive function is the ability to process information necessary for "voluntary action". Metacognitive functions may be separated into knowledge tasks (i.e., thinking about thinking) and regulatory tasks (i.e., error detection, memory retrieval). Either or both may be explicit or implicit, but the regulatory form of metacognition is what is responsible for general emotion regulation. The voluntary action of executive function may be responsible for developing the subconscious role of metacognitive regulation and, therefore, is more responsible for regulation dysfunction seen in toddlerhood.

The current study will explore the roll of executive function skills in the development of the emotion regulation process.

Maladaptive Emotion Regulation Development

Research indicates that the controllable aspect of attention and inhibition within metacognitive development are important factors in the appropriate development of emotion-regulation (Berger, 2011; Fonagy & Target, 2002; Posner & Rothbert, 1998). For example, if a child has difficulties with attention, inhibition, and general social awareness, then a child's metacognitive development will likely be affected and result in affected emotion regulation skills. Disorders that may affect attention, inhibition, and social learning are numerous, including attention-deficit hyperactivity disorder, Tourrette's syndrome, and intellectual disability. Autism Spectrum Disorders (ASD) is marked by significant dysregulation early in life.

ASD and Emotion Regulation. Studies focused on emotion regulation difficulties in ASD are few and far between, but there is a wealth of information describing emotion regulation as a source of significant concern. The title of Kanner's original 1943 review of children with ASD implies significant atypicalities in expressed, social-based emotions (i.e., *Autistic Disturbances of Affective Contact).* The review goes on to further describe the "disturbances" as lacking in cause and logical resolve. More recently, the need for focused research on emotion regulation difficulties in ASD is highlighted by Mazefsky, Pelphrey, & Dahl (2012), stating that despite the clinical knowledge of emotion-based difficulties in ASD, emotion regulatory research is failing to sufficiently expand its focus into this targeted population. Mazefsky et al. (2012) discuss the issues of perseveration, or refusal to shift to new or novel interest, as having an emotion-based component and not only a neurological component. Examples of this might include stereotyped interests or repetitive behaviors. Mazefsky and colleagues (2012) relate the

specific difficulties of perseveration to an impaired progression along the typical regulatory pathway. Mazefsky and colleagues continue to discuss the regulatory pathway specifically within the framework of the modal model (Gross, 1998; Gross & Thompson, 2007). The review of Mazefsky and colleagues suggests that symptoms of emotion regulation difficulties relate to observable ASD symptoms and that repetitive behaviors are working to regulate the emotions in children with ASD.

The relation between regulation difficulties and repetitive behaviors may be suggestive of a different pathway toward emotion regulation in children with ASD, rather than a delayed or impaired progression along the regulatory pathway, as Mazefsky and colleagues suggests. In other words, there may be a qualitative difference in the regulation patterns of children with ASD, rather than a delayed or impaired pattern. The suggestion of a different pathway toward emotion regulation may include an increased focus on repetitive behaviors to calm the nervous system and, without the intrusion of parents or peers, may be sufficiently calming and functional for the child with ASD. Yet, this qualitatively different style may not be functional within the given environment of children with ASD, whereby typically developing individuals such as parents or peers, will almost certainly intrude on a child's play environment at one time or another and thereby disrupt the regulatory pathway (i.e., a child is handflapping and perseverating on a perfectly arranged line of trains; a parent comes along and picks up a train, disrupting the perfect arrangement, and also disrupting the child's regulatory attempt).

ASD Symptoms related to Emotion Regulation. ASD is characterized by a set of core symptoms, including difficulties with social-communicative interactions and the presence of repetitive, restricted, and stereotyped interests (APA, 2013). The core symptoms suggest the likelihood of emotion regulation difficulties, as social interactions are heavily implicated in

metacognitive development (i.e., developing theory of mind). Difficulties in the core areas are apparent in the first twelve months of life through noticeable deficits in social orienting, as shown through studies analyzing archival video from first year birthday parties (Osterling & Dawson, 1994; Werner, Dawson, Osterling, & Dinno, 2000). Dawson, Meltzoff, Osterling, Rinaldi, & Brown (1998) report that young children with ASD show atypical attention to social stimuli compared to nonsocial stimuli. For example, children with ASD are less likely to turn when their name was called than when a bell is rung. There are two key aspects of emotion regulation integral to its development in typical toddlers: social learning and attention. Both areas are atypical in children with ASD within the first year of life. The deficits in social orienting are followed by atypical shifts in attention and eye gaze to others and the additional development of repetitive behaviors (Grelotti, Gauthier, & Schultz, 2001; Klin, Jones, Schultz, Volkmar, & Cohen, 2002; Lewis & Bodfish, 1998).

Neurological Symptoms Related to the Development of Emotion Regulation. Recent ASD studies link neurological structure and activation to the observed behavioral symptoms. The modal model of Gross and Thompson (2007; Figure 2) is a behavioral pattern that matches well with current trends in neurological research. Decreased activation in the prefrontal cortex accounts for difficulties with attention and behavioral inhibition in both young children and adults with ASD (see Volkmar, Lord, Bailey, Schultz, & Klin, 2004, for a full review). Courchesne et al. (2011) report findings through postmortem studies indicating that children with ASD have 67% more neurons in the prefrontal cortex (PFC), with 79% more in the dorsolateral PFC. The dorsolateral PFC is highly responsible for organization, attention, motor planning, and regulatory abilities. One of two things may be occurring to explain the neuronal abnormalities: 1) there is increased neuronal overgrowth prior to birth, suggesting that ASD is technically

present prior to birth or 2) appropriate cell death is not occurring following birth, making ASD a postnatal occurrence (Lainhart & Lange, 2011; Courchesne, 2001, 2011).

The net result of either explanation is that there are neuronal abnormalities present prior to the 12 month birthday, which is when most researchers are noting the earliest signs of ASD symptoms (i.e., not orienting at birthday parties; Dawson & Osterling, 1994; Werner, Dawson, Osterling & Dinno, 2000). If the abnormalities are present prior to the 1st year birthday, either at the postnatal or prenatal periods, then these abnormalities are likely effect cognitive functioning related to emerging executive functions within the first year of life. Based on the evidence from Courchesne et al. (2011), children with ASD are likely to have significant difficulty at the second step of the modal model of emotion regulation (i.e., attention deployment) early in development. Difficulties with executive functions early in development would indicate potential success of using the modal model of Gross and Thompson (2007) early in development.

The point of referencing neurological foundations in ASD is not to redirect the focus of the study from observation to physiological. A discussion on neurological foundations is intended to illuminate the specific abnormalities present in ASD and how they likely affect the development of emotion regulation and executive functions. Children with ASD are already documented to have observed difficulties in the areas of executive function and dysregulation, but the neurological studies document structural abnormalities that are a significant cause of the observable impairments. These findings of emotion regulation further emphasize that the atypical development of emotion regulation in children with ASD should not be confused with a delay in the skill development, such as the delays observed in language and adaptive skills. The neurological studies previously mentioned emphasize the structural differences between ASD and typically developing children and indicate that the structural differences may be indicative of

a qualitative difference in regulatory pathways between groups across the lifespan.

Assessment of Emotion Regulation: How is it Measured?

The importance of addressing the problems of emotion regulation early in development cannot be understated, as early deficits in emotion regulation development are linked to problematic regulatory strategies and adaptability in later childhood (Acebo & Thoman, 1995; Gustafson & Harris, 1990; Morris, 2009). The lack of adequate emotion-regulatory skills affects later social information processing and suggests that interventions should focus on emotion-regulatory skills (Dawson, 2008; Lemerise & Arsenio, 2000; Prizant, Wetherby, Rubin, & Laurent, 2003). If a child is poorly regulated, he will be less likely to learn new information and attend to the surrounding environment, such as in school settings. Parent reports support the school-based implications, as children with ASD show greater difficulties with attention, inhibitory control, and capacity to be soothed. The difficulties with the three areas lead to increased stress in learning situations and make the assessment of such difficulties altogether more important (Konstantereas & Stewart, 2006).

Intervention can target emotion regulation. The SCERTS model (Prizant, Wetherby, Rubin, Laurent, & Rydell, 2006) is based on the assumption that developmental improvement in children with ASD is maximized through the integration of goals focused on social communication, emotion regulation, and transactional support. As each goal is targeted, the improvement in one domain is shown to improve the development of the other two domains. The SCERTS model does not clearly define the cognitive aspects of emotion regulation. Studies documenting and replicating the reliability and validity of the SCERTS model among ASD samples have not been published.

Measurement of Emotion Regulation. The precise measurement of emotion regulation

skills parallels the difficulty with constructively defining emotion regulation. The SCERTS model is one of many models available that references the importance of targeting emotion regulation skills through intervention and observation, but is intended for atypical populations. There are a variety of available methods for assessing emotion regulation capacities in toddlers with typical development, but the literature has not yet established a general gold-standard of emotion regulation assessment. For example, the ADOS-2 is an accepted gold-standard measurement for autism symptoms as it correlates well with an agreed upon set of ASD symptoms and is based on clinical observation.

Adrian and colleagues describe the past two decades as an "affect revolution" that have produced a variety of measures and conceptualizations for emotion regulation but that have encountered roadblocks in the development of an observation-based assessment (Adrian, Zeman, & Veits, 2011). For example, many of the observation-based assessments are not able to capture the internal processes of regulation and only target the external symptoms. Other assessments rely on child interview or parent report, both of which are troublesome when assessing a child with ASD. Children with ASD may have social and communication impairments which impede their ability or their parent's ability to effectively complete these assessments. The particular displays of emotional instability may also vary across contexts, making parent report difficult. For example, a child may display frequent symptoms of rigidity or tantrums in grocery stores, but in no other location. An ASD-specific measure of emotion regulation is both necessary and beneficial.

The Infant-Toddler Social and Emotional Assessment (ITSEA; Carter & Briggs-Gowan, 2006) is the only detailed measure of emotion regulation for toddlers with atypical development (Wachtel & Carter, 2008; Carter, Briggs-Gowan, Jones, & Little, 2003). While the ITSEA has

been used for samples of ASD children, it has not been studied extensively within the context of emotion regulation in ASD and its full utility within this population is not well understood.

The ITSEA takes approximately 25 to 30 minutes to complete and provides measurements of externalizing, internalizing, dysregulation, and competence behaviors related to emotions. Briggs-Gowan & Carter (2007) report successful use of the ITSEA in early intervention settings, with results correlating significantly to the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000) and showing acceptable internal consistency. The advantage that the ITSEA provides is the clear measure of dysregulation which is lacking in the CBCL. The dysregulation scale on the ITSEA has brief questions of negative emotionality and sensory sensitivities, but does not include other suggested displays of dysregulation (i.e., repetitive behaviors and stereotypies).

Mazefsky et al. (2012) indicates that the presence of repetitive or perseverating behaviors may be symptomatic of emotion regulation difficulties. For example, a child may be agreeable and adjust to change well, but that same child may be always hand-flapping as he adjusts to the change. The ITSEA provides no feedback regarding the presence of repetitive behaviors. While the ITSEA would likely benefit from a generous expansion of assessed behaviors of emotion regulation, this type of expansion would be ill-advised as the measure is already lengthy. Expansion for use in ASD would needlessly increase parent burden in the evaluation process when ASD is not part of the referral question.

Proposed Study

The proposed study introduces a novel approach to assessing emotion regulation in toddlers with ASD. Currently available emotion regulation assessments present measurement problems that compromise the clinician's ability to thoroughly assess the precise difficulty a

child with ASD may be having with emotion regulation. Direct observation is a noted "gold standard" of emotion regulation assessment in developmental research (Cummings, Davies, & Campbell, 2000). There is a lack of literature comparing emotion regulation measures. It is common for researchers to develop their own systematic observation suited to their question. In a review of the literature for the past 35 years, most observations were used, on average, in approximately three studies (Adrian, Zeman, & Veits, 2011). A majority of the observations examine the child in isolation or in the face of frustrating tasks (i.e., Strange Situation; Ainsworth and Bell, 1970) and others involve waiting, delays of gratification, and anger induction. Only one study uses naturalistic observation, with the method being family-friendly and less stressful than previous studies for all involved (Tonyan, 2005).

The SCERTS Assessment Process Observation (SAP-O) is a promising observation-based measure of emotion regulation, yet is developed around the premise of observing the child across a multitude of contexts. The reliability of the SAP-O within a standard, one or two-day evaluation has yet to be reported (Odom, Boyd, Hall, & Hume, 2010; Prizant et al., 2006). When direct observation is not available, clinicians and researchers must rely on parent report assessments, such as the ITSEA. A second parent-report measure that shows promising assessment of emotional behaviors problematic within an ASD sample includes the Ages & Stages Questionnaire – Social-Emotional version (ASQ-SE; Squires, Bricker, & Twombly, 2002). The ASQ-SE is lengthier than the ITSEA and has yet to be validated within an ASD sample for sufficiently identifying particular emotion regulation difficulties. There are currently no observation-based measures designed to target global emotion regulation difficulties within an ASD sample based on a single observation.

Due to the lack of acceptable parent reports on emotion regulation, and insufficient

research on observational methods of emotion regulation skills in toddlers with ASD, the development of an observational method specifically designed to target ASD symptoms would be beneficial, as this reduces parent burden through the evaluation process (Briggs-Gowan, Carter, Irwin, Wachtel, & Cicchetti, 2004). The first purpose of this study is to develop a measure that is administered by the clinician, thereby reducing caregiver burden in the evaluation process, and employing the preferred method of observation-based assessment. The second purpose of this study will be compare ratings of this measure across diagnostic groups (e.g., typical development to ASD). Finally, the third purpose of this study will be to explore ratings of emotion regulation relative to ratings of ASD symptoms. It is predicted that toddlers who have fewer symptoms of emotion dysregulation will also display fewer symptoms of ASD.

Emotion Regulation Assessment for Autism. The Emotion Regulation Assessment for Autism (ERAA; see Appendix A) is an observation-based measure developed to assess the process of emotion regulation in toddlers with ASD. The ERAA is not meant to be a replacement or addendum to the ITSEA. A simple expansion of the ITSEA would only add to parent burden and would not be a preferred course of action. The ERAA is intended to be a separate measure and is expected to more accurately reflect emotion regulation in ASD through codes targeting specific, known difficulties in ASD. The identification and definition of targeted behaviors is based upon the modal model presented by Gross (1998; Gross & Thompson, 2007) in conjunction with symptoms of ASD (APA, 2013). The ERAA can conceptually be considered as a measure that may guide intervention, based on its close relationship with the specific steps of the modal model. By providing the examiner with a specific sequence of steps and substeps, the clinician may be better able to pin-point behaviors for intervention. For example, if a child is not yet watching another person's action (item 4e), the clinician may target the behavior of social

orienting before targeting social interactions (item 4f). The combination of clinical-treatment benefits make the ERAA a conceptually unique measure that has not yet been studied. Measure development for the ERAA closely follows the development of a similar observation measure for toddlers with ASD, the Autism Observation Scale for Infants (AOSI; Bryson, Zwaigenbaum, McDermott, Rombough, & Brian, 2008).

The ERAA measures emotion regulation processes through samples of play involving the toddler with a primary caregiver and second sample with a clinician (i.e., stranger). Caregiver and clinician-based play are used to assess the varied forms of emotion regulation strategies across different contexts, contrasted by differing social presses. The social presses are defined as independent play, joint-interactive play, and disruptive play (Table 1). Joint-interactive play and disruptive play are differentiated by the intention of the adult. If the adult is trying to change the way that a child is playing with a set of toys, then it is classified as disruptive. If the adult is merely joining the child in play with the same set of toys, then this is classified as joint-interactive. Each play context is identified by a blind observer who codes an individual ERAA for that single instance of play. All ERAAs completed for a given play sample are averaged together for an overall ERAA score.

In addition to the examination of emotion regulation skills across differing social presses, different play partners are explored. Previous studies report differences in play behavior across familiar versus unfamiliar play partners (Lord, 1984, 1993; Nadel et al., 2000). The present study examines the differing displays of emotion regulation among familiar versus unfamiliar play partners to examine if emotion regulation skills vary as ASD symptoms vary among play partners.

Hypotheses. The proposed study hypothesizes that positive emotion regulation skills are

inversely related to ASD severity. The following hypotheses are tested:

1) The ERAA is predicted to be a reliable measure among blind coders across the full sample.

2) a. Difficulties with emotion regulation as measured by the ERAA are expected to positively correlate with ASD symptoms as measured by the Childhood Autism Rating Scale, Second Edition, Standard Version (CARS2-ST; Schopler, Van Bourgondien, Wellman, & Love, 2010).

   b. A negative correlation between the CARS2-ST and SAP-O is predicted within the ASD sample, with a stronger correlation existing between the ERAA and CARS2-ST than between the SAP-O and CARS2-ST. The existence of a stronger correlation between the ERAA and CARS2-ST would suggest that the ERAA is a more dynamic measure of emotion regulation difficulties for children with ASD than the SAP-O

3) a. ERAA scores are predicted to positively correlate with scores on the ITSEA scales of dysregulation across the full sample.

   b. The ERAA is predicted to positively correlate to the CARS2-ST (i.e., ASD symptoms) more strongly than the ITSEA to the CARS2-ST. As the CARS2-ST is not administered to participants within the typically developing sample, this hypothesis is only applicable to the ASD sample.

4) Hypotheses 2 and 3 will be reanalyzed through partial correlations, controlling for the Global Executive Composite (GEC) of the BRIEF-P. Given that the ERAA is based on the development of executive function skills, a child's level of executive function development should significantly impact his or her displays of emotion regulation skills. GEC is predicted to significantly impact the correlations presented in Hypothesis 2 and 3.

5) a. ERAA scores are predicted to remain consistent across all play contexts for children with typical development, as they are not predicted to have significant difficulties with emotion regulation across social contexts.

b. Based on the previous findings of differing behaviors among types of play partners (i.e., familiar versus unfamiliar; Lord, 1984; Nadel et al., 2000), toddlers with ASD are expected to exhibit more difficulties with emotion regulation during more socially structured play with strangers (i.e., research personnel) as opposed to caregivers. Difficulties with emotion regulation will again be reflected through higher ERAA scores.

c. Children with ASD are expected to show increased symptoms of emotion regulation difficulties, as reflected through higher scores on the ERAA, during joint-interactive and disruptive forms of play. Joint-interactive and disruptive play are reliant on social attention and reciprocal social interactions. Play that is reliant on social interactions is predicted to exhibit more symptoms of emotion regulation difficulties than independent styles of play (Dawson et al., 1998, Grelotti, et al., 2001; Klin et al., 2002; Lewis & Bodfish, 1998).

METHODOLOGY

Participants

Thirty-one toddlers with ASD and 31 age-matched toddlers with typical development were recruited through the University of Alabama Autism Spectrum Disorders Research Clinic (ASDRC), the University of South Alabama Autism Spectrum Disorders Clinic, the University of Alabama at Birmingham Sparks Clinic, and local community programs and preschools. Given the age restriction of the ITSEA and the CARS2-ST, participation in the current study was restricted to children between 24 and 36 months of age.

Children with ASD were included based on current age and an official ASD diagnosis, as reported by either the clinician or parent. While a larger sample would be ideal to more thoroughly assess all subscales of the ERAA, power analyses reveal that a minimum of 31 children are sufficient to assess the predictive nature of the ITSEA and ERAA on ASD symptoms. For analysis to fully explore all subs
cales of the ERAA within the ASD sample, power analysis reveal a necessary sample of at least 49 participants. Given that the average age of diagnosis within the state of Alabama is 6 years, collecting upwards of 50 well-matched participants within the toddler stage of development was not realistic for the current study.

All children within the ASD sample had their diagnoses confirmed by the principal investigator through the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord, Luyster, Gotham, & Guthrie, 2012; Lord, Rutter, DiLavore, Risi, Gotham, & Bishop, 2012) and Childhood Autism Rating Scale, Second Edition, Standard Version (CARS2-ST;

Appendix B; Schopler et al., 2010). A detailed demographic form was used to collect information related to current or previous therapeutic services, to account for any variances among child ERAA scores being related to interventions variations (See Appendix C). Specific interventions that would be important to note would be those that target emotion regulation improvement, such as SCERTS, or those that target specific play behaviors. All but 2 children were involved in at least some type of therapy, with the most popular being speech therapy services. Most speech therapy services were associated with some level of Early Intervention Services. The demographic form did not distinguish between private speech therapy services and those associated with early intervention agencies.

Children with typical development were included based on their current age and lack of previous diagnoses. Children with typical development were assessed through the same demographic questionnaire administered to the ASD group to screen for any confounding developmental or language disorders. The Mullen Scales of Early Learning (MSEL; Mullen, 1995) was additionally used to screen for any unreported developmental difficulties for the typically developing children, as well as for assessing developmental skills for the typically developing children in relation to those with ASD.

Procedure & Materials

All sessions took place at either the University of Alabama ASDRC, University of South Alabama Autism Spectrum Disorders Research Clinic, or at the child's local preschool. Each session was conducted in a small, carpeted room devoid of distracting stimuli (i.e., other toys unrelated to the study). Parents were provided with informed consent documents, as their child played independently with a pop-up toy. Following informed consent, children were administered the Mullen Scales of Early Learning (MSEL; Mullen, 1995), followed by the

ADOS-2, if necessary. After the assessments, the play samples were administered. During these activities with the children, parents were asked to complete the ITSEA, BRIEF-P, and demographic form (See Appendices D, E, and C, respectively). To lessen the burden placed on families, caregivers were thanked for participation by being provided with a $30 gift card at the end of all study procedures. Children were given an opportunity to select a small toy from a prize box at the conclusion of the study. All study procedures were typically completed in 90 minutes.

Measures.

Mullen Scales of Early Learning (MSEL; Mullen, 1995). The MSEL is used to obtain a measure of developmental abilities for children and to ensure the typical development of children in the control group. The MSEL is comprised of five subtests: gross motor, fine motor, visual reception, expressive language, and receptive language. The MSEL is used with children from birth to 68 months of age and can be completed in 25 to 35 minutes. Activities involved in the MSEL are toy-based and presented as a series of puzzles and questions.

Autism Diagnostic Observation Schedule, Second Edition (ADOS-2 ; Lord, Luyster, Gotham et. Al, 2012 ; Lord, Rutter, DiLavore, et al. 2012). The ADOS-2 is a semi-structured play session that provides an assessment for the deficits of ASD (i.e., social-communication and unusual/repetitive behaviors). The ADOS-2 is diagnostically specified to aid in the identification of Autism and Autism Spectrum. Note that the DSM-5 only recognizes a single diagnosis of ASD and does not differentiate between Autism and Autism Spectrum (APA, 2013). The ADOS-2 distinction is in reference to previous diagnostic categories of ASD as represented in the DSM-IV-TR (APA, 2000). The ADOS-2 consists of 5 modules, ranging from 1 to 4 and an additional Toddler module (T), with each module based on the language acquisition and

development of the individual. For the participants recruited for the current study, only modules T and 1 are used. A standard evaluation takes around 30 to 45 minutes to complete. The ADOS-2 is administered to all children within the ASD sample to confirm the diagnosis of an ASD.

Play Sample. Two 15-minute play samples are completed: one sample involving play with a caregiver and another involving play with an unfamiliar research assistant (i.e., stranger). For the thirty minutes of play, children are provided with 3 distinct toy boxes; see Figure 3 for pictures and a detailed list of each toy box; Figure 4 provides images of the playroom set-up. The first play partner (either parent or stranger) introduces the first toy box for a few minutes, ignores the child for approximately one minute, and then resumes playing. At 11 minutes, all play partners are instructed to direct the child into a clean-up routine. Following the clean-up, the next box is introduced with the entire session ending at 15 minutes. Next, the second play partner comes to the floor and begins engaging the child in the second toy box. The sequence of play-ignore-play-clean-up-play repeats, totaling to three toy boxes used in all. To protect against order effects, the order of play partner is counterbalanced, as are the toy box orders and placement of the "ignore" action (i.e., toward the beginning or end of the play sample). Please see Table 2 for a detailed description of the counterbalancing conditions. A total of 24 conditions were created.

Regarding instructions for play partners, parents are instructed to: "play with your child as you typically would at home. If your child becomes upset, please comfort him/her in the way that you typically would." A specific script is provided in Appendix F for instructions provided to parents. Parents are also instructed that approximately halfway through the sample, they will be handed a demographic form. While this demographic form provided researchers with needed information, it also provides an opportunity for researchers to observe the child playing while

their parent is busy (i.e., prompting a structured independent play setting). Once the demographic form is complete, the parent is instructed to rejoin their child in play (i.e., the joint-interactive style of play). The clean-up routine provides a structured style of disruptive play that allows researchers to assess if the child complies with the command or protests.

Research assistants acting as the "stranger" are given similar instructions, with the exception of structured independent play; assistants are told to simply ignore the child until cued to rejoin in play (i.e., play with another toy apart from the child). Assistants are also provided with specific instructions for how to play with children with ASD, as this type of play may be one-sided and unusual (see Appendix G). The principle researcher is running the camera, and strangers are cued to begin the ignore procedure at either minute 3 (middle-ignore) or minute 7 (late ignore). The ignore procedure lasts a strict 1-minute. The same 1-minute time frame is used for the administration of the demographic form to parents. The 1 minute time frame is more flexible for the parents, as they are not cued to rejoin their child in play until completing the form.

Brief Rating Inventory of Executive Function – Preschool Version (BRIEF-P; Gioia, Espy, & Isquith, 2003; Appendix E). The BRIEF-P is a 63-item parent-questionnaire use to assess a child's executive functions within the context of typical day-to-day environments. The BRIEF-P is designed to be administered to children between 2 and 6 years. A typical administration takes approximately 10 to 15 minutes and produces 5 clinical scales and 4 indexes of executive function skills, including an overall index, the Global Executive Composite (GEC). Clinical scales include: inhibit, shift, emotional control, working memory, and plan/organize. Broad indexes include: inhibitory/self-control, emergent metacognition, flexibility, and the GEC. A copy of the BRIEF-P is provided in Appendix D.

Infant-Toddler Social & Emotional Assessment (ITSEA; Carter & Briggs-Gowan, 2006; Appendix D). The ITSEA is a 166-item parent-questionnaire used to assess emerging social-emotional development in toddlers between the ages of 12 and 36 months. A typical administration takes approximately 10 to 15 minutes to complete, producing 17 subscales and 4 domains of emotionally-related skills including externalizing, internalizing, dysregulation, and competency. A copy of the ITSEA is provided in Appendix E.

Observation-Based Assessments. Three observation-based assessments are administered following participation in the study. These do not require the presence of the participants or their parents, as evaluations are based on the recorded play samples.

Childhood Autism Rating Scales, Second Edition, Standard Version (CARS2-ST; Schopler et al., 2010; Appendix C). The CARS2-ST is a 15-item rating scale completed by a clinician to assess observed and reported symptoms of ASD. A typical administration takes approximately 10 minutes to complete and is reliable on children ages 24 months to 6 years. Symptoms assessed on the CARS2-ST that may be of particular importance to emotion regulation inquiries include relating to people, emotional response, adaptation to change, fear or nervousness, and activity level.

SCERTS Assessment Process – Observation (Prizant et al., 2006; Appendix I). The SCERTS Assessment Process - Observation (SAP-O) is included in the following study for two reasons: 1) To build in an additional observation-based measure that is reported to be reliable estimate of emotion regulation skills in ASD; and 2) To demonstrate the increased usefulness of the ERA in assessing problematic emotion regulation skills in an ASD sample. The SAP-O consists of three assessment areas, including social, communication, and emotional regulation. For the purposes of the current study, only the emotional regulation portion of the SAP-O was

used. The emotional regulation portion is divided into two sections: mutual regulation and self-regulation.

As the SAP-O is intended to be an average of a child's performance over 4 observations, it provides ample opportunity for the observation of specific behaviors. These opportunities are limited in the current study as families are only attending for one session. Many of the mutual regulation items are inappropriate and difficult to assess within a single 15-minute sample and only the self-regulation portion is used. The self-regulation portion of the SAP-O consists of 20 criterion measures assessing the child's ability to enact self-initiated regulatory processes. Areas of self-regulation assessed include availability for learning and interacting, use of behavioral strategies in familiar activities, regulation of emotion during new and changing situations, and ability to recover from extreme dysregulation.

ERAA. The ERAA (see Appendix A) is a 15-item observation-based assessment completed by blind coders. It contains subscales based on the modal model (Gross, 1998; Gross & Thompson, 2007), including situation modification, attentional deployment /cognitive change, response modulation and repetitive behaviors. The repetitive behaviors subscale is an additional component that is not present on the traditional modal model. For the ERAA, repetitive behaviors are coded as either being present or not, along with their total duration.

Each subscale is assessed during three types of play: independent play, joint-play with a partner, and disruptive play with a partner. A separate ERAA score is assessed during each style of play, for each moment of play. For example, a child may play with his parent for 2 minutes with a picnic set, and then switch to playing by himself with the picnic set for another 3 minutes, followed by the parent introducing a ball game for 4 minutes. This constitutes 2 minutes of Joint-Interactive Play, 3 minutes of Independent Play, and 4 minutes of Disruptive Play. All

three ERAA scores are averaged together to create an overall ERAA score for the entire sample (e.g., *ERAA total* = [2 + 3 + 4]/3 = *3*). Each 15 minute play sample in the current study includes a unique set of Independent/Joint/Disruptive play codes, with variable numbers of each but all play samples contained at least one of each style of play. All children are coded on the ERAA for play with their parent and a second ERAA is completed for their play with the research assistant. These two separate ERAA totals are averaged together to create a single, averaged total for each child.

Regarding the structure of the ERAA, the scale is based on social interactions for a two reasons. First, ASD is noted as having significantly atypical reactions to social situations. Second, emotions are proposed as a primary means of helping a person efficiently deal with interpersonal encounters (Ekman, 1992). Any maladaptive development of the emotion regulatory process should be most evident through social interactions.

Coding. For ERAA coding, recorded play samples are reviewed by 4 blind coders to identify moments of independent play, joint-interactive play, and disruptive play (see Table 1). Independent play is defined as the child playing independently, without attempted interaction by the adult. Joint-interactive play is defined as the parent either attempting to join the child's play within the same activity or engaging in parallel play with the same toy or toy set. Disruptive play is defined as the parent attempting to shift or change the focus of the child's play to a new toy, activity, or behavior with the toy. Following the identification of these moments, coders complete the appropriate ERAA form for each play moment. To be qualified as a moment of play, the moment is required to last at least 10 seconds and involve the child touching the toy (independent); parent and child touching the toy, which is initiated by the child (joint-interactive); or parent and child touching the toy, which is initiated by the parent (disruptive).

See Appendix H for a copy of the data dictionary provided to all coders.

Prior to experimental coding, coders are trained on the ERAA using a randomized selection of play samples of toddlers with both typical development and ASD obtained from the ASDRC's research database. Training involves meeting agreement with the master coder, followed by continual agreement/reliability checks for approximately 10% of the total experimental codes. To meet initial agreement, coders code two samples independently and discuss disagreements with the master coder. Another set of two videos are coded, followed by another review session. A final 10 videos are coded to establish final reliability. If kappa values are at or above the acceptable kappa criterion on these final 10 videos, training is considered to be complete. See Table 3 for reliability information on all coders, including interrater reliability.

Kappa Criteria. Cohen's kappa criterion typically provides an advantage over percent agreement between two raters because it corrects for chance agreement, with chance resting at 50% (Cohen, 1960; Bakeman, Quera, McArthur, & Robinson, 1997). A 50% chance agreement is under the general assumption that there is a 50% chance of randomly selecting the correct or incorrect response, thereby insinuating that the general baserate of an observable behavior is 50%. With these assumptions, kappa criteria of .81 and above infers nearly perfect agreement, 0.61-.80 infers substantial agreement, and .41-.60 inferring moderate agreement (Landis & Koch, 1977; Cohen 1960). When baserates are significantly less than 50%, one of the key assumptions of kappa is violated and the chance of randomly selecting the correct response may be significantly greater than or less than 50%.

Observing a traditional baserate of 50% will likely not occur in an ASD sample, as symptoms are occurring at frequent rates (i.e., hand-flapping occurs more frequently than in children with typical development). The baserate for hand-flapping would be different for a

typically developing group, given the extreme rarity of hand-flapping in a typically developing sample. Recent studies have found that, for behaviors where baserate falls significantly above or below 50%, kappa may be artificially low and incorrectly infer low agreement between raters (Bakeman et al., 1997; Bruckner & Yoder, 2006).

A proposed solution to the problem of artificially low kappas is beginning to appear and gain attention in the literature. In short, the proposed solution corrects kappas for observed baserates and for the fallacy of observers (Bakeman et al., 1997; Bruckner & Yoder, 2006; Gardner, 1995). While the proposal of corrected kappas is initially described by Bakeman et al. (1997), Bruckner and Yoder (2006) have expanded on the idea and present an easy-to-apply approach for researchers to use when baserates appear to be significantly less than 50% for observed behaviors. It should be noted that the approach of Bruckner and Yoder has been used more in recent years, particularly in research involving clinical populations (Casey, McWilliam, & Sims, 2012; Herbers, 2011; Higginson, 2007; Messinger, Mahoor, Chow, & Cohn, 2009; Witte, Timmons, Fink, Smith, & Joiner, 2009). A literature search reveals 13 studies since 2006 citing the Bruckner & Yoder (2006) study and 60 studies citing the analysis by Bakeman et al. (1997).

Pilot data for the current study produced an estimated baserate for the ASD sample on the overall ERAA as resting between 0.62 and 0.7. Codes for the sample with typical development fell between 0.28 and 0.38. These numbers are as expected, given that typically developing children should have few observable difficulties with emotion regulation, thereby resulting in very low baserates. The current study is hypothesizing that children with ASD will have significantly more difficulties with emotion regulation and will thereby have significantly higher baserates. Based on the pilot baserates and criteria from Bruckner & Yoder (2006; Table 4),

ERA coders should attain a Cohen's kappa of approximately 0.59 for both ASD and TD, assuming that they are 90% accurate in their scoring. With regards to the SAP-O, observed baserates ranged between .71 (ASD) and .89 (typical development). Based on the modified criteria of Bruckner & Yoder, this would indicate a kappa range of .39-.60 for 90% accuracy, or substantial agreement for coders, and a kappa range of .61-.78 for near-perfect agreement.

RESULTS

Primary Analysis

Participant demographics, as well as overall means and standard deviations are presented primarily in Tables 5 and 6, but additional means and standard deviations are presented in Tables 7 and 11. Both diagnostic groups appear evenly matched across age, with no significant difference between ages for the ASD and TD groups. As expected, there is a significant difference between groups with regards to developmental level, as assessed by the MSEL Early Learning Composite (ELC). See Tables 5 and 6 for a demographic summary of participants.

For the primary analysis, none of the variables across the overall sample are skewed or kurtotic (i.e., values were between +/- 1.00). Regarding skewness and kurtosis in the separate diagnostic groups, the typically developing sample is negatively skewed with regards to Overall SAP-O scores and the ITSEA dysregulation index. Both variables would be expected to be skewed in the typical development sample, as lower scores on the ITSEA and higher scores on the SAP-O are indicative of typical development (i.e., low rates of emotion dysregulation and high rates of emotion regulation skills, respectively). Out of caution, the SAP-O and the ITSEA were corrected via log transformation, but neither significantly affected the following results.

Overall distributions of age and developmental level are presented in Figure 5. For the following results, the term “Overall ERAA” consistently refers to an average between total Parent ERAA and total Stranger ERAA scores. Similarly, “Overall SAP-O” consistently refers to an average between total Parent SAP-O and total Stranger SAP-O.

Hypothesis 1: ERAA Reliability. Interrater reliability for the ERAA was assessed for all 62 participants using Cohen's kappa values based on the assessed baserates for ASD and typically developing samples, as discussed in the Methods section of this paper (Bruckner & Yoder, 2006; Cohen, 1960). As shown in Table 3, all ERAA coders are in substantial agreement, based on even the most conservative and traditional criteria (Landis & Koch, 1977; Cohen, 1960). Based on the adjusted baserates of Bruckner & Yoder, all coders are at near-perfect agreement, with the exception of interrater agreements. Interrater reliability on both the SAP-O and ERAA is variable with regard to kappa criteria. These results support the assertion of Hypothesis 1, indicating that the ERAA is a reliable measure based on the current coding definitions.

Hypothesis 2: ERAA relation to ASD Symptoms. To assess the predicted positive correlation between ERAA scores and ASD symptoms (Hypothesis 2a), Pearson correlations were computed between ERAA scores and CARS2-ST scores. The results of these correlations indicate a significant, positive relationship between the Overall ERAA score and CARS2-ST, r (31) = .51, $p < .01$. Higher scores on both the ERAA and CARS2-ST are indicative of more concerning symptoms. See Table 7 for all subscales and correlations.

For Hypothesis 2b, a negative and stronger correlation is shown between the Overall SAP-O and the CARS2-ST, r (31) = .68, $p < .01$, thus supporting the predicted relationship between autism symptoms and emotion regulation difficulties. See Table 7 for full subscales and correlations. Smaller SAP-O scores are indicative of more concerning emotion regulation difficulties, while higher scores on the CARS2-ST are indicative of more concerning ASD symptoms. The correlation between the Overall SAP-O and CARS2-ST was compared to the correlation between the Overall ERAA and CARS2-ST using a Fisher r-to-z transformation. The

Fisher r-to-z transformation does not indicate significant differences between the two correlations, z = -1.29, *p* = .19.

Hypothesis 3: ITSEA relation to ERAA and ASD Symptoms. Pearson correlations were computed between the ITSEA and the ERAA (Hypothesis 3a) for both separate diagnostic groups and the overall sample (see Tables 8, 9, and 10). Results show that the ITSEA scales of dysregulation are significantly correlated with the ERAA for the overall sample, but these significant findings do not remain when samples are assessed independently. In other words, neither the ASD nor the typically developing group show significant correlations between the ITSEA and the ERAA.

Pearson correlations were computed between ITSEA dysregulation scores and CARS2-ST scores (Hypothesis 3b) but these relationships are not statistically significant (see Table 11). The correlation between the ITSEA and CARS2-ST was compared to the correlation between the Overall ERAA and CARS2-ST using a Fisher r-to-z transformation. As presented in Table 11, there are no significant differences between the ERAA and the ITSEA with regards to their relationship to ASD symptom severity.

Hypothesis 4: The Role of Executive Function in ASD Emotion Regulation. The correlations listed in hypotheses 2 through 3 were reanalyzed through partial correlations, controlling for the General Executive Composite of the BRIEF-P (GEC). The results are presented in Tables 12 and 13. Results of hypothesis 2 remain largely unchanged. The partial correlation between the Overall SAP-O and CARS2-ST was again compared to the partial correlation between the Overall ERAA and CARS2-ST using a Fisher r-to-z transformation, indicating an even larger lack of significant differences between the two correlations, z = -0.94, *p* = .34. The same lack of change is found for Hypothesis 3, where significant correlations are

additionally not found between the ITSEA and the CARS2-ST, despite having controlled for executive function development. Fisher's z-score transformations comparing the ERAA to the ITSEA and the SAP-O to the ITSEA show similar results to the original transformation without the partialling of GEC (Table 13).

Hypothesis 5: ERAA Construct and Social Environment. A 3 (play context: independent vs. joint-interactive vs. disruptive) x 2 (play partner: caregiver vs. clinician) x 2 (diagnosis: ASD vs. typical development) ANOVA was used to assess if the dependent variable, ERAA ratings, differ across three independent variables. The independent variables used 2 within-subjects variables (play context and play partner) and 1 between-subjects variable (diagnosis). Significant two-way interactions were found between the following: partner and diagnosis, $F(1, 1596) = 28.11$, $p < .01$, $\eta^2_p = .02$; context and diagnosis, $F(3, 1596) = 35.09$, $p < .01$, $\eta^2_p = .06$; partner and context, , $F(3, 1596) = 3.36$, $p = .01$, $\eta^2_p = .006$ (see Table 14; Figure 6). There are more distinct differences between the diagnostic groups when the partner is a stranger, rather than a parent (Figure 6a) and across all contexts of play (Figure 6b). Children with ASD are shown to have higher ERAA scores across all analyses. Regardless of diagnosis, all children display significant differences in ERAA scores based on play partner, with higher scores shown for the stranger condition, except for contexts involving Independent Play (Figure 6c).

For the overall sample in Figure 6, ERAA scores are higher during the parent condition of independent play. Greater differences in ERAA scores are noted between play partners when the play is joint-interactive, as opposed to independent or disruptive. These data for the overall sample, indicate that the most disparate scores on the ERAA tend to occur with strangers during joint-interactive play. However, these data also indicate that higher, or more problematic, ERAA scores are occurring within the Independent Play, even though the groups did not differ in that

play context. Effect sizes are small for all interactions, with the exception of the two-way interaction between Play Context and Diagnosis, which show a medium effect size.

A significant three-way interaction between play context, partner, and context was found and is illustrated in Figure 7, $F(3, 1596) = 4.08$, $p < .01$, $\eta^2_p = .008$. The three-way interaction supports the predictions of hypotheses 5a, 5b, and 5c, indicating that emotion regulation is significantly different between diagnostic groups based on the type of play partner present and the context of play involved (i.e., independent vs. joint vs. disruptive play. In comparison to children with typical development, children with ASD show more dysregulation during joint interactive play with strangers than with parents. In comparison to children with ASD, children with typical development show more dysregulation with parents than with strangers, especially in independent play

Post hoc analyses using Tukey HSD were used to explore the effects of play contexts through pairwise comparisons, finding that, fitting with predictions, play contexts significantly differ in their impact on ERAA scores. However, the pattern of impact is not supported and is instead found to be reversed. Predictions were that more socially-dependent play contexts (i.e., disruptive and joint-interactive play) would produce higher ERAA scores in children with ASD. Specifically, disruptive play was predicted to produce higher ERAA scores than the other two contexts, followed by joint-interactive play. Instead, Independent Play is found to have a higher ERAA score ($M = 4.11$), followed by Disruptive Play ($M = 3.04$), and finally Joint-Interactive ($M = 2.74$)

Secondary Analysis

ERAA vs. SAP-O. Regarding the relationship between the SAP-O and the ERAA, a variety of significant correlations are shown between the two measures and their subscales, with

an overall significant negative correlation between overall scores for the ERAA and the SAP-O, r (62) = -.67, p<.01. See Table 15 for a more detailed description of correlations between subscales. Note also that a negative correlation indicates similar levels of concerns between the two measures, as lower score on the SAP-O are of greater clinical concern, whereas higher scores are of more clinical concern for the ERAA. Both measures also produce significantly different scores for the ASD and typically developing groups, as shown in Table 7.

ERAA Order Effects. Order of independent play is not found to significantly affect the ERAA totals (i.e., if independent play was structured in the beginning or middle of the play sample). Order of stranger versus parent play was also tested and produces no significant differences on ERAA scores.

ERAA Play Context Effects. The level of dysregulation during independent play within the structured independent play was compared to the rate of dysregulation that occurred in other play contexts using paired-sample t-tests. Significant differences are not found in dysregulation levels between structured independent play (i.e., independent play during the ignore task) and the overall independent play occurring across all 3 contexts, indicating that a single, structured ignore task is comparable to naturally occurring independent tasks (Table 16). The disruptive play context produces different results, indicating that the structured disruptive task (i.e., clean-up routine) is significantly different from the overall average of all disruptive moments in the play sample (Strangers: t(60) = -2.26, p<.05; Parents: t(60) = -2.13, p<.05). The significant difference is present for the overall sample for the parent play samples, but not for the separate diagnostic groups and also not for play samples involving a stranger (Table 16).

The structured clean-up routine of disruptive play was compared to the average joint-interactive play through paired samples t-tests, to explore the possibility of structured clean-up

being more distressing than other forms of disruptive play (i.e., changing from picnic to bubbles may be an enjoyable disruption versus a clean-up routine). Significant differences are found across all diagnostics groups and partners, with the exception of the ASD group during play with a stranger. Again, these data are available in Table 16.

To assess the effects of structured constructs on Hypothesis 5 (i.e., structured vs. overall independent play and distressing vs. less distressing disruptive play), the 3x3x2 ANOVA of Hypothesis 5 was rerun with the structured, contextual averages presented in Table 16. The medium effect size between Play Context and Diagnosis was lost, resulting in all small effect sizes (see Table 17). The significance of the three-way interaction is also lost, as well as the two-way interaction between Play Context and Play Partner. The two-way interactions between Play Context and Diagnosis and Play Partner and Diagnosis remain significant. All three play contexts are significantly different from one another using post-hoc testing. The means and standard deviations for these structured contexts are presented in Table 18.

An additional consideration was made for the overall directedness of the play partners in play, as well as the gender of the play partner. Parents were rated as either overly passive, overly directive, or neither passive nor directive in their play styles with the children. Both gender and parent behavior were entered into the structured (i.e., Table 17) 3x3x2 ANOVA as covariates, with all significant interactions remaining, as presented in Table 19. The significance of each interaction is lowered slightly, but all remain significant. Main effects exist for play partner and behavior but the effect sizes for each are small.

ERAA and the Modal Model. Paired samples t-tests were used to assess the individual modal components of the ERAA, finding that attention deployment questions are significantly higher than scores on response modulation, t (30) = 4.21, p<.001, but not higher than those of

situation modification. The difference between situation modification and response modulation is trending toward significant, t (30) = 1.93, p=.06. A significant intercorrelation is shown between attention deployment and situation modification, r(31) = .36, p=.04. See Tables 20, 21, 22, and 23 for a more detailed review of modal model correlations.

ERAA and Repetitive Behaviors. The current dataset reflect significant correlations between the ERAA scores and duration of repetitive behaviors for both parent and stranger play samples, respectively, r(62) = .59, p<.001, r(62) = .51, p<.001. A similar pattern is seen with the SAP-O: Parent RSB time, r(62) = -.44, p<.001; Stranger RSB time, r(62) = -.27, p=.04.

ITSEA and Diagnostic Differences. The ITSEA dysregulation index was compared across diagnostic groups using an independent samples t-test. A significant difference between diagnostic groups is shown, with more significant difficulties existing in the ASD group, t(59) = 25.91, p < .001 (Table 6).

BRIEF-P. While the BRIEF-P was not found to significantly impact the correlations of Hypotheses 2 and 3, a secondary analysis was explored to look more closely at the effects of other indexes/scales aside from the GEC. Specifically, the Shifting Scale was of notable interest due to previous research suggesting deficits in disengaging and shifting attention between stimuli (Courchesne, Townsend, Akshoomoff et al., 1994; Landry & Bryson, 2004). Partial correlations of the relations in Hypotheses 2 and 3 were again analyzed, partialling out the effects of shifting. No significant changes related to Hypotheses 2 and 3 were produced when partialling out shifting. These results were almost identical to the results when GEC was partialled out. Similar to the GEC, the Shifting scale also produced significant differences between the diagnostic groups, t(59) = 25.91, p < .01.

DISCUSSION

The present study aims to create a measure of emotion regulation, unique for use in ASD, and to examine how emotion regulation presents within an ASD sample. The creation of this type of measure may aid in helping clinicians to better understand the unique dysregulation styles seen in young children with ASD. Some of the hypotheses are supported, as noted below. Future study is hoped to support the utility of the ERAA in treatment planning.

First, hypothesis 1 is supported, as the ERAA was found to be a reliable tool across trained coders, indicating that coders could agree on their observation of specific behaviors related to emotion regulation using the ERAA. Second, hypothesis 2 predictions are supported as the ERAA is significantly correlated with ASD symptoms on the CARS2-ST while another measure of emotion regulation, the SAP-O, was also correlated with ASD symptoms. The overall difference between the two correlations is not significant. Third, hypothesis 3a is supported, showing significant correlations between the ERAA and the ITSEA. Hypothesis 3b is not supported, as the correlations between the ITSEA and CARS2-ST are not significantly weaker than those of the ERAA and CARS2-ST. Hypothesis 4 is also not supported, as ERAA results are not significantly affected by the development of executive function, as assessed by the GEC composite of the BRIEF-P. Finally, all three parts of hypothesis 5 are supported, as the ERAA is significantly impacted by both diagnosis and environmental stressors, such as play partners and context. The overall impact of play context is not entirely supported, as disruptive play was predicted to have a greater effect on ERAA scores. Instead, independent play is found to be the most distinctive of the three contexts.

The three-way interaction of hypothesis 5 is notable, with results indicating that the biggest difference in ERAA scores between children with ASD and TD children occurs when they are engaged in joint play with a stranger. In the joint play context, children with ASD are more dysregulated with strangers than with parents, and that pattern is not evident for TD children (see Figure 7). While the two-way interactions show significantly higher ERAA scores for children with ASD during play with strangers and during independent play, the independent play context does not produce the same size of discrepancy between the type of play partners (stranger vs. parent) as does the joint-interactive play context (Figure 6c). Data suggest that the joint-interactive play produce the most discrepant of the ERAA scores between diagnostic groups (Figure 6b).

Study Impact: A Framework for Understanding Behavioral Difficulties in ASD

The results of the current study present a framework that helps to describe why the problematic behaviors of emotion regulation are occurring and the sequential, smaller behaviors that may be precipitating their occurrence. The current study posits four key points for ASD research and treatment that will be discussed in the remainder of this section: 1) emotion regulation symptoms are both separate and unique to ASD; 2) independent play skills are as equally important as social play skills; 3) disruptions and transitions are not all altogether problematic; and 4) strangers and parents uniquely affect displays of emotion dysregulation in children.

1) Emotion Regulation Symptoms in ASD are Both Separate from and Unique to ASD. The small-to-moderate correlations between the ERAA/SAP-O and the CARS2-ST suggest that emotion regulation difficulties go hand-in-hand with ASD severity. While the ITSEA does not correlate significantly with the CARS2-ST, the correlations of both the ERAA

and the ITSEA with the CARS2-ST do not differ significantly, despite one pairing being significant (ERAA/CARS2-ST) and the other not (ITSEA/CARS2-ST). The discrepancy between the correlations suggests that the significant relationship of the ERAA with ASD symptoms is not strong enough to differ significantly from the non-significant findings of the ITSEA relationship with ASD symptoms. The ERAA and ITSEA do not appear to be assessing similar symptoms of emotion regulation and may be assessing separate emotion regulation constructs.

The above findings are key to clinicians planning intervention directions and strategies, as emotion regulation appears to be a unique difficulty for some children with ASD and is possibly separate from their core ASD symptoms. Interventions should focus heavily on emotion regulation skill development for select children, outside of targeting core ASD symptoms. Current therapies target the ASD symptoms first with the underlying theory that increased communication, structure, and social skills will alleviate the emotion regulatory difficulties. The current therapy approach suggests that the emotion regulatory difficulties are a by-product of the ASD symptom severity. While possibly true, it does not sufficiently negate the importance of targeting the skill early in development. Currently, intense, daily structure and social skill training that specifically target dysregulation difficulties may not start until 5 or 6 when the child begins school or, worse, until after the dysregulation has become a clear, disruptive problem in the classroom. By this point, children have already experienced the natural tantrums of the toddler years, intermixed with ASD difficulties, and are heavily conditioned to express themselves through maladaptive manners. More emotion regulation-specific interventions should be explored that target the earliest signs of emotion regulation difficulties prior to age 3.

The current study presents a framework for such an intervention to be based on a modal model of self-regulation. The ERAA is based upon the assumption that emotion regulation follows a five-step, modal model (Gross & Thompson, 2007): situation selection, situation modification, attention deployment, cognitive change, and response modulation. The current study assumes that children with ASD are primarily impaired at the attention deployment level, but the attention deployment step is also shown to be intercorrelated with the situation selection step. For the ERAA, questions related to attention deployment and situation modification are highly similar and both hinged on differing aspects of social attention. Given these similarities, it is not surprising to find that the two scales do not differ significantly from one another. Further testing on a larger sample should be carried out to further understand the intercorrelations between the two steps of the modal model.

Further study on a larger sample may also support the complex differences between the attention deployment and situation modification steps, as researchers are separating the two constructs into two distinct questions for an intended purpose. First, the question on situation modification is intended to target a child's capacity for noticing changes in his or her environment. The child may either consciously or unconsciously attend to this change, hence the question on attentional deployment, or continue focusing on their previous activity. There may be a handful of children with ASD that struggle with Attention Deployment and another handful that struggle more with Situation Modification. While the current sample is too small examine these possibilities, future research should explore these considerations within a larger sample. A true distinction may indicate two different approaches for targeting emotion regulation difficulties in different children.

2) Independent Play is Worth Assessing. Play samples involving direct play with partners may probe the social nature of ASD but do not necessarily communicate all of the difficulties that child may be having. Results from hypothesis 5 indicate that, for both children with ASD and typical development, watching a child play independently with an adult nearby may be just as informative of their emotion regulation skills as more social-forms of play.

The nature of independent and solitary play has been described in ASD within the context of unsophisticated play and social skills, but has not been related to emotion regulation. A detailed literature search found no prior research indicating emotion regulation difficulties during independent play. If researchers and clinicians are targeting social and play skills but fail to do so during independent play, they may be skipping an integral step in skill development. Vygotsky stipulates that learning must occur within the zone of proximal development (1978). The zone of proximal development for a child with ASD is likely going to begin with independent play, as children with ASD are more drawn to independent styles of play than social styles of play.

While not predicted in the hypotheses, the results of independent play disregulation appear logical. As children with ASD are having difficulties with sophisticated and appropriate toy play, they also do not know how to initiate interactions with the adult for help either by eye gaze, actions, or words. The lack of understanding and assistance may leave the child feeling frustrated. However, if an adult offers help, the social interaction is also confusing and the altered situation is equally distressing. While this scenario is conjecture, the nature of independent play warrants further study, particularly with regards to the modal model of the ERAA. The item of "situation modification," (i.e., when another person alters the environment)

may help to further clarify which children are having more difficulty with independent play and with what specific parts.

While children with ASD are shown to have difficulties with independent play, children with typical development are also shown to present similar patterns of emotion dysregulation, indicating that expressions of dysregulation during independent play is not a diagnostic or characteristic of ASD. However, as children with ASD are also found to dislike social interaction and are more inclined to seek out independent play more frequently, dysregulation during independent play may be an ideal context to begin skill development of regulatory processes.

3) Disruptions and Transitions Are Not Altogether Problematic. Transitions and disruptions are typically of heavy focus for clinicians in ASD treatment planning. This focus is not without merit, as numerous studies point to their problematic effects on behavior (Banda & Grimmett, 2008). The results of the current study suggest that the severity of dysregulation may not be due explicitly to the transition itself, but to the type of transition that is occurring. For instance, using picture schedules in school settings for all children may be unnecessary. Instead, the single transition from afterschool care to the carpool lane for one particular child may be the only problematic moment in the day. The afterschool transition may need extra supports. While many skilled clinicians already do this by instinct, the instinct may not be as well developed in the non-ASD-specific clinician who is receiving increasingly more ASD-specific referrals in today's treatment environment than ever before.

In the current treatment environment, families are lucky to find a clinician with extensive ASD experience and the waiting list for such a service is extensive in many states. By producing measures such as the ERAA that are both usable by the novice clinician (note: coders in the

current study were novice) and emphasize the nature of transition, rather than the pure aspect of transitions in general, both non-ASD-familiar clinicians and educators may feel more comfortable integrating some children with ASD into the typical classroom. For example, if a child has a resulting ERAA Disruptive Play score of 1, which is very low, then that child would likely be a low risk for dysregulatory behaviors during a school day full of unexpected transitions. This child would likely not need extensive supports for behavior management, despite the severity of his ASD.

A secondary impact of noting the type of disruption involves intervention planning. For example, if a child is noted as having significant problems with disruptive play, an interventionist may practice with small disruptions and work up to medium ones with the goal of the larger, more severe disruption. This approach is very similar to exposure therapy in cognitive therapy and is highly efficacious in a variety of diagnostic populations (Emmelkamp, 2004). Many therapists do a form of this in ASD treatment, but often not until the child is older and showing more obvious, classic signs of anxiety. As intervention literature suggests, it would be better to start the acquisition of these regulatory skills at the earliest age possible and the implementation would be quite simple, given current treatment approaches. For example, Billy becomes upset when it's time to leave the playground. A therapist might implement an exposure process by getting Billy involved in a chase game that goes first to the border of the playground, then somewhat outside the border of the playground, then completely outside the border of the playground. The graduated exposures are gentle exercises with disruptive play, but are typically not emphasized very much in toddler-based therapies, especially in a systematic way designed to target specific types of disruption. Practices of disruption are often done within play-based

therapies, such as through sabotaging the environment. The current study suggests that play sabotage may not be as universally distressing as previously thought.

4) Strangers and Parents Uniquely Affect Displays of Emotion Dysregulation. A final impact of the current study involves the higher ERAA scores present in the play samples involving strangers, rather than caregivers, for children with ASD (see Figure 6a). While it is not a unique finding to suggest that children are more withdrawn or anxious around strangers, this is the first study to quantify these differences as varying across play contexts for children with ASD (Dawson et al., 1998). The results of the current study are fitting with previous research suggesting that children with ASD show a general disinterest in unpredictable or new and unique styles of social interaction, which is characteristic of extended play with a stranger (Gomot & Wicker, 2012; Dawson et al., 1998; Lord, 1984; Nadel et al., 2000). In addition to the general impact of stranger-based play, the greatest discrepancy of ERAA scores between diagnostic groups is shown during joint-interactive play which would logically involve the greatest impact of the stranger on the play of the child, as opposed to other less socially-dependent contexts of play (see Figure 6b).

For children with ASD, the impact of a stranger on joint-interactive play would likely present high levels of anxiety, given the unpredictable nature of the interaction. Children with ASD are documented to have significantly higher symptoms of anxiety than children with typical development, and the anxiety may be presenting itself as dysregulation during play in the early toddler years (van Steensel, Bogels, & Perrin, 2011; White, Oswald, Ollendick, & Scahill, 2009; Reaven, Blakely-Smith, Culhane-Shelburne, & Hepburn, 2012; Green, Ben-Sasson, Soto, & Carter, 2012). Future studies should further explore the relation between heightened levels of anxiety during stranger-based, joint-interactive play.

Children with typical development show an opposite pattern of ERAA severity, indicating more dysregulation during play with their parents (Figure 6a). Explanation of the reasons behind the reversed effects is outside the scope of the current study, but may implicate a variety of factors warranting future study. Children with typical development may be more skilled at inhibiting or hiding their feelings of discomfort or irritation with strangers. Alternatively, children with typical development may be experiencing excitement in the novelty of a new play partner, as their lowest average score is evident in joint-interactive play with a stranger.

Commentary on Measures Used

ERAA. While the current study presents strong data supporting the potential utility of the ERAA, it also presents additional considerations that must be taken into account. First, the specific relationship between the ITSEA and the ERAA is less than clear. While significant correlations are found between the two measures across the overall sample, the significant relationship does not remain for the separate diagnostic groups, with a similar pattern resulting in SAP-O comparison. The lack of clearly significant correlation between the ERAA and the ITSEA may suggest that the ERAA is assessing symptoms of ASD, more than emotion regulation. However, the contextual influence of the environment on ERAA scores, as evidenced by play partners and styles of play, may argue against this point. ASD is defined across the literature as a pervasive disorder, meaning that the symptoms occur across contexts and should not vary significantly. In other words, the symptoms do not appear to wax and wane. In contrast to ASD symptoms, the symptoms of emotion regulation in the ERAA appear to vary significantly across contexts, with the greatest symptoms appearing during independent play with a stranger.

It is critical to note that during the moments of independent play, children with ASD rarely approached or referenced their parents for interaction, despite the parent being seated in the same small room. While independent t-tests do not indicate a significant difference among diagnostic groups for approaching parents, coding in the current study does not control for referencing or speaking to parents during the independent play samples. Future studies on the ERAA should consider these referencing behaviors as methods of emotion regulation, as this may help to further differentiate children with significant more regulatory difficulties related to social referencing. Regardless of social referencing control, children with ASD may be experiencing more difficulties with emotion regulation during independent play because they do not have an adult present to help mediate troublesome moments (i.e., not getting a toy to work). Future study should explore the extent of independent play difficulties across a larger sample, as the regulatory difficulties are likely to vary significantly across children with ASD depending on a number of factors (i.e., developmental level, age, intervention exposure, etc.).

The Modal Model. As presented in Tables 20, 21, 22, and 23, specific aspects of the modal model were compared between diagnostic groups, exploring the relationship between the different sub-steps or modal questions of the ERAA across stranger and parent play. For children with ASD, the correlational patterns between parents and strangers appear similar, with a consistent trend of significant correlations between the overall score and different sub-steps of the modal model. The exceptions to this similarity are the lack of significant correlations between the overall score and response modulation during independent play with a stranger and response modulation during joint-interactive play with a parent. The lack of significant correlations during these play contexts may be suggestive of children with ASD showing symptoms of improved regulation (i.e., lower ERAA scores) during independent play with a

stranger, despite the heightened overall ERAA score, and during joint-interactive play with a parent. For children with typical development, the patterns were far more scattered, as play with a parent resulted in more consistent significant correlations between modal model steps and the overall ERAA score than between the overall ERAA score and modal steps during play with a stranger. The discrepant patterns within typical development make sense, as children with typical development will likely respond more warmly and consistently during play with a parent. For children with ASD, their styles of interaction may be more consistent across parent and stranger play, based on the overall preference for nonsocial stimuli, indicating that the type of social partner may not be a significant factor in their regulatory skills.

When exploring the correlations among diagnostic groups and play partners, an overall pattern emerges of significant correlations between major styles of play (i.e., joint interactive play) and other aspects or sub-steps of the modal model. However, when looking at the sub-steps, (i.e., attention deployment during joint-interactive play) the pattern of significant correlations is not consistent across diagnostic groups and partners. For example, in Table 21, columns 2, 6, 10 are almost entirely significant, whereas the other columns are more diverse with regards to significance. This generalization is true for all tables except for Table 22, describing play with a stranger for children with typical development. Table 22 displays far less significant correlations than the other three tables, with many correlations existing within individual play contexts (i.e., joint-interactive play is only correlated with sub-steps within joint-interactive play).

The above patterns hold 2 implications: 1) the overall average of a particular type of play is likely just as indicative of problematic skills as the specific scores on each sub-step or overall ERAA average; and 2) children with typical development engage in far less predictable styles of

play during play with a stranger. The second implication is not to suggest that stranger-based play for children with typical development is not informative of overall regulation, but many of the correlations were significant only between the specific context of play (i.e., sub-steps of joint-interactive play were only significantly correlated with the overall average of joint-interactive play and one aspect of disruptive play). In contrast, stranger-based play for children with ASD produced significant correlations across sub-steps and overall averages of independent play, joint-interactive, and disruptive play. For parent-based play, children with typical development had significant correlations between sub-steps of joint-interactive play and independent play, as well as joint-interactive and disruptive play. The pattern was similar for parent-based play in children with ASD.

The implications for these patterns may be that, for children with ASD, the specific play context used for assessing regulatory skills may not be altogether important. Tables 20 and 21 indicate that nearly all play contexts, regardless of stranger or parent-based play, produced significant correlations with the overall ERAA ratings. For clinical utility of the ERAA, this is an important feature, as the ERAA may be informative when administered in only one context (i.e., with a parent during joint-interactive play, as opposed to ensuring administration of all other contexts). The patterns were not consistent for children with typical development but, again, the ERAA is designed specifically for children with ASD meaning that the measure may be inappropriate for other populations.

SAP-O. The current study marks one of the first studies to present the SAP-O as a reliable research tool and presents reliability data suggesting its general utility in assessment. While the SAP-O has been used as a research tool in intervention planning, the authors have yet to publish reliability data or present the SAP-O as a research tool. In contrast to predicted

results, the SAP-O is reliable and significantly more correlated with ASD symptoms than the ERAA. These results may suggest that the SAP-O is either more closely linked to constructs of ASD or is more reflective of ASD-specific difficulties within emotion regulation. Further study on the SAP-O and the ERAA should be carried out to clarify the differences and similarities.

ERAA vs. ITSEA. The results of the relationship between the ITSEA and the ERAA are indicative of the ERAA contributing uniquely to the study of emotion regulation in children with ASD. In contrast to the ITSEA, the ERAA produces a diverse array of difficulties to help create an emotion regulatory profile. For example, some children may have more difficulties with response modulation, but others may have more difficulties with attention deployment. While the ITSEA has subscales for specific dysregulation difficulties, the subscales do not appear to be related to ASD difficulties as reflected by the lack of correlation between ITSEA and the CARS2-ST. The ITSEA reflects elevated symptoms within the ASD group, but does not indicate a significant relationship with ASD severity. The ASD mean of 64.71 does not reach the level of clinical concern, as this would be a level of 65 or above. The standard deviation of the ASD sample is relatively broad (26.05), indicating that not all children with ASD are demonstrating emotion regulation concerns via ITSEA report.

A construct-based argument may counter the described differences between the ERAA and ITSEA, suggesting that the ITSEA ma be assessing emotion regulation symptoms that are completely unique and unrelated to ASD symptoms. However, professionals who work with children with ASD in a clinical setting would likely argue that children with ASD present a unique profile of emotion regulation difficulties, distinct from the difficulties experienced by children with typical development (Laurent & Rubin, 2004; Mazefsky Pelphrey, & Dahl, 2012). For example, when children with ASD are dysregulated, they are likely exhibiting symptoms that

are not assessed on measures like the ITSEA, such as repetitive behaviors or restricted interests. Note that repetitive behaviors were correlated with heightened ERAA scores. The degree to which repetitive behaviors are used may reflect a phenotype of children: children who retreat to restricted interests during times of stress may be better able to learn strategies to regulate his or her emotions than a child who resorts to screaming or head-banging. The current dataset reflect significant correlations between the ERAA scores and time spent in repetitive behaviors for both parent-based and stranger-based play samples. Previous research has demonstrated conflicting findings regarding the relationship between repetitive behaviors and emotion dysregulation (Leekam, Prior, & Uljarevic, 2011). The current study provides support for the relationship between repetitive behaviors and emotion dysregulation and thus warrants further study in future research designs.

BRIEF-P. The BRIEF-P GEC is included in the current study to assess the predicted impact of executive function on emotion regulation abilities. Executive functions as assessed by the GEC are not found to significantly impact the regulatory skills as measured by the ERAA. The lack of significant impact of the GEC may be a result of poor measurement, with the GEC not adequately assessing executive function skills. A more simple and likely explanation is that emotion regulation is not clearly impacted by executive function skills early in the toddler years as executive function skills are still developing. Future study should explore the impact of executive function on emotion regulation more thoroughly by including a variety of measures, including specific cognitive tasks to assess the differing performance of children across diagnostic groups. Parent report is not considered to be a gold-standard of symptom assessment. Parent report of executive function skills may be artificially high, particularly for the children

with ASD. Parents may be overestimating their child's ability to plan and voluntarily execute tasks.

Conclusion

The present study marks one of the few studies in ASD focused on emotion regulation and refining its assessment. Children with ASD display elevated levels of frustration and are restricted in either their abilities or willingness to ask others for help or engage with others as a source of comfort. Emotion regulation difficulties may present road blocks to ASD-specific therapies depending on the approach. Pivotal Response Training (PRT) may induce tantrums when the child does not receive the desired object. PRT dictates that clinicians "wait out" the tantrum until the desired response is produced by the child (Koegel, Koegel, Harrower, & Carter, 1999; Sherer & Schreibman, 2005). Other therapies like the Early Start Denver Model (ESDM; Rogers & Dawson, 2010) instruct clinicians to avoid such a negative response. ESDM clinicians are no longer operating in the optimal framework for skill acquisition if a child becomes significantly upset.

ESDM is unique in its acknowledgement of emotion regulation being problematic. Preventing or avoiding a tantrum is easier said than done, particularly when the root cause for the tantrum is difficult to judge. ESDM actively avoids the disregulated moment and is therefore not addressing the underlying issues that are contributing to its production. A measure such as the ERAA attempts to break the tantrums down into steps and allows clinicians to identify the root-cause for a child's tantrum and thereby confront the issue in treatment. An example of this is presented below:

1. A child, "Billy" is administered an ERAA for a 15 minute play sample.

2. Results indicate that Billy has significantly more difficulty with Disruptive Play, and no difficulties with Joint or Independent Play. He is having the most difficulty with Atttention Deployment and noticing that a person is present and modifying his environment.
3. Treatment would first target having the child orient toward a new person during moments of disruption (i.e., a step above the optimal response for attention deployment), as opposed to focusing on eye contact during disruption. Therapies such as ESDM focus heavily on having the clinician position themselves within the eyesight of the child, such as lowering one-self to eye-level. While this may still be appropriate given the ERAA results, a simple focus on facial orienting may be more appropriate at the beginning of therapy than a goal of eye contact. Reducing the focus on eye-contact within treatment is not intended to suggest that increasing eye-contact is incorrect. For some children, eye contact may be too intense and upsetting. A measure such as the ERAA may help to better identify the children for whom eye contact is too difficult. These children may instead show greater progress and fewer tantrums by first targeting facial orienting, then following with a focus on eye contact.

Additional Considerations

While the current study demonstrates positive utility of the ERAA and its basis on the modal model, the implicit assertion of processing style within the modal model is worth discussing briefly. Cognitive studies in recent years have supported the theory of parallel systems and rejected strict information processing styles (McClelland & Rogers, 2003). It is beyond the scope of this study to engage in the debate between two processing styles,

particularly when there are studies of emotion regulation arguing for both styles. It would benefit both areas of research to engage in a collaborative study of emotion regulation and perhaps, what may emerge, is a version of the modal model that involves a parallel approach in typical individuals. Still, the current study may not be in complete opposition to parallel processing theories.

Returning back the example of a toddler learning to walk (page 8 of this document), the individual, major motor actions involved in walking are more easily observed in younger children than adults (i.e., the stilted projection of one foot in front of the other; it begins at the hips, evolves into a stiff bend of the knee, but later becomes a fluid motion in childhood). Walking could also be described as a parallel process, as the motor movements are occurring in conjunction with other processes, such as observing and maneuvering around obstacles. The, gross motor action of walking is one "strand" of the parallel process and is more easily observed in toddlerhood. Similarly, he modal model may be one "strand" of a child's temperament or regulation skills, but is still more easily observed as a single process during toddlerhood.

It is important to recognize that individuals with ASD are likely limited in their use of parallel processing systems, given the smaller "bandwidth" of cortical connectivity (Just, Cherkassky, Keller, Kana, & Minshew, 2007). Persons with ASD may be more inclined to engage in a strict-information-style of processing, with limited capacity for parallel styles. If this hypothesis is true, observing the "kinks in the armor" of emotion regulatory skills of children with ASD may be easier than in children with typical development, as the steps in a person with ASD are occurring in a sequential fashion.

Limitations and Future Directions

Participants. A significant limitation to the current study involves the sample used. A

larger sample would ensure larger effects with a more heterogeneous group. For example, the ASD group is positively skewed and platykeurtic on developmental level as assessed by the MSEL ELC, but is normally distributed on age and scores on the ERAA and SAP-O. The platykeurtic nature of the ELC is difficult to avoid, outside of a larger sample. Many of the participants with ASD were achieving the lowest score possible on the ELC, meaning that these data are not adequately reflecting the developmental level of the sample. Using a different measure, such as the Bayley Scales of Infant and Toddler Development (Bayley, 2006), may produce differing results and reflect a more normal distribution of developmental skills. The typically developing group is negatively skewed on the SAP-O. These results are as expected with typical development. Children with typical development have few difficulties with emotion regulation and are expected receive high scores on the SAP-O. Instances of lower scores on the SAP-O should be few, given the lack of reported developmental difficulties. All other aspects of the typically developing samples, such as age, developmental level, and ERAA scores, are normally distributed.

The inclusion of a developmental delay (DD) sample would be beneficial to account for the accuracy of the ERAA in identifying emotion regulation difficulties in children with ASD apart from other diagnostic categories. The ERAA is designed to target ASD-related symptoms. A DD sample may not be distinguishable from a typically developing group with regards to emotion regulatory difficulties but may be distinguishable from the ASD sample. The distinction between a DD and ASD sample on emotion regulation difficulties would better direct clinicians in symptom-specific treatment planning.

Recruitment. A final limitation to the current sample involves recruitment methods. Children with ASD were recruited from ASD clinics when presenting for an ASD evaluation.

The chances of pre-involvement with intensive therapy services are high, particularly as a large referral source to ASD-specific clinics are early intervention programs. Twenty-nine out of thirty-one children were already involved with early intervention at the time of study procedures. A sample targeting newly identified children may produce a set of ERAA scores that are more variable than the current sample. Newly identified children may be more readily available at the office of pediatricians, rather than an ASD-specific clinic. Children involved with early intervention services versus more intensive private services may also produce a different array of ERAA scores.

An additional limitation to recruitment involved children's involvement in daycare. Very few of the ASD children were enrolled in daycare programs and, for those who were, the hours were lower than children in the typical development sample. While this may be an artifact of recruitment sites (i.e., clinics for ASD and daycares for children with typical development), it may be indicative of something more, such as parents of children with ASD not feeling comfortable enrolling their child in a daycare program. The effects on children with ASD in daycare are worth exploring, given the amount of structure and possible increased focus on socialization with other children.

Measures. The ERAA results present possible overlap between the attention deployment and situation modification modals. A similar relationship should be explored with regards to the cognitive change step of the modal model (i.e., deciding to remain with the same toy as the play partner, or switch to a new toy given the partner's level of involvement). The current study chose to combine aspects of cognitive change and attention deployment into one category due to complexities developing in coder reliability. A previous question existed to distinguish the two steps from one another, but coder reliability was proving difficult, given the close relation to

each. Extended training may better correct for these reliability difficulties and produce a more concise, yet detailed measure. Extended training may also benefit from including a vast array of children with ASD.

With regards to the SAP-O, the measure was not used in the current study as intended. Reliability coefficients may be higher if used across 4 contexts, as directed in the manual. Still, the manual-based method is more time consuming for clinicians and the measure was reliable in the current study under the modified conditions. Further study comparing the SAP-O to the ERAA might indicate the ERAA as more cost effective.

Coding. A significant limitation of sample coding rests with coder training, as training may benefit from a broader array of ASD samples. Reliability may also look different if training were provided to skilled clinicians. Coders in the current study were undergraduate volunteers with previous clinical exposure to ASD populations. The clinical exposure was varied and not controlled for in study procedures. A comparison of ERAA reliability should be explored to compare the training of individuals with previous and no previous experience in ASD clinical activities. Coders in the current study were trained on an average 7 children. These children represent a mix of ASD and typical development, meaning that coders were only exposed to approximately 3 to 4 children with ASD. The limited exposure may have made training more difficult, as fewer examples exist for training on certain behaviors (i.e., they may have only had one example of a child moving their toy away from a parent upon interaction).

The reliability of coding should be explored through live-coding. Current ASD evaluations entail a variety of time-consuming measures and clinicians may quickly find themselves mired in the scoring of a variety of different protocols. A proposed ERAA administration for future study involves live-coding. Reliability of live-coding may involve one

clinician/assistant playing with a child for a few minutes, while a second and third clinician/assistant views from behind an observation mirror to complete the ERAA. Follow-up studies may help to refine the ERAA for quick and easy utilization in assessment and treatment planning. Future studies should also explore the cut-offs for clinical significance in the ERAA using a larger, more heterogeneous sample of varying diagnostic and non-diagnostic samples.

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Table 1

Definitions of Play Contexts

	Independent Play	Joint-Interactive Play	Disruptive Play
Child	Child plays alone	Child actively plays with adult	Child plays either alone or with adult
Adult	Adult not actively playing with child	Adult actively plays with child	Adult attempts to play with the child
Activity	--	Same activity between child/adult	Adult attempts to change activity

Note. Definitions of play contexts used in a single ERAA observation.

Table 2.

Administration Orders

Administration Order	Participants (*n*)			Parent/Stranger First	Demographic at Beginning (1) or Middle (2)	Toy Box Order
	Total	ASD	TD			
1	2	2	0	P	1	1,2,3
2	3	2	1	S	1	1,2,3
3	3	3	0	P	2	1,2,3
4	2	2	0	S	2	1,2,3
5	3	1	2	P	1	3,1,2
6	2	0	2	S	1	3,1,2
7	3	1	2	P	2	3,1,2
8	3	0	3	S	2	3,1,2
9	3	3	0	P	1	2,3,1
10	2	1	1	S	1	2,3,1
11	3	0	3	P	2	2,3,1
12	4	2	2	S	2	2,3,1
13	2	0	2	P	1	3,2,1
14	3	2	1	S	1	3,2,1
15	3	1	2	P	2	3,2,1
16	2	0	2	S	2	3,2,1
17	4	2	2	P	1	2,1,3
18	1	1	0	S	1	2,1,3
19	2	1	1	P	2	2,1,3
20	2	1	1	S	2	2,1,3
21	2	2	0	P	1	1,3,2
22	2	1	1	S	1	1,3,2
23	3	1	2	P	2	1,3,2
24	3	2	1	S	2	1,3,2

Table 3.

Reliability of Coders.

	SAP-O (Cohen's Kappa/Percent Agreement)	ERAA (Cohen's Kappa/Percent Agreement)			
		ERAA Overall	IP	JP	DP
Baserate Averages (ASD/TD)	.70/.90	.69/.33			
All Coders Average	.74/89	.81/87	.81/84	.78/87	.82/89
Coder 1		.71/83	.73/77	.70/84	.66/86
Coder 2		.77/83	.69/71	.79/89	.86/89
Coder 3	.78/90	.87/89	.90/93	.79/85	.90/88
Coder 4		.87/93	.90/95	.85/91	.86/93
Coder 5	.73/83				
Coder 6	.71/94				
Interrater					
1 vs. 2		.39/63	.22/50	.33/61	.53/72
3 vs. 4		.74/88	.67/81	.75/88	.89/96
5 vs. 6	.39/82				
5 vs. 3	.42/76				

Note. Based on the pilot baserates and criteria from Bruckner & Yoder (2006; Table 2), ERAA coders should attain a Cohen's kappa of approximately 0.59 for both ASD and TD, assuming that they are 90% accurate in their scoring. For these modified kappa criteria, .78 and above would indicate near-perfect agreement, with .59-.77 indicating substantial agreement. For traditional criteria, .81 and above indicates near-perfect agreement, with .61-.80 indicating substantial agreement (Landis & Koch, 1977; Cohen 1960). SAP-O kappa values should rest between .39-.60 for 90% accuracy and substantial agreement; .61 and above for near-perfect agreement. The above data indicate a minimum of substantial agreement for even the interrater agreements, and near-perfect agreement for all individual coders.

Table 4.

Expected Values of Kappa

Best est. of true baserate	Accuracy .8	Accuracy .85	Accuracy .9	Accuracy .95	Accuracy .99
.1	.168	.257	.39	.605	.897
.2	.264	.381	.532	.732	.939
.3	.321	.447	.599	.782	.953
.4	.351	.479	.631	.804	.959
.5	.36	.49	.64	.81	.96
.6	.351	.48	.631	.804	.959
.7	.321	.447	.599	.782	.953
.8	.265	.381	.532	.732	.939
.9	.168	.257	.39	.605	.897

Note. Expected Values of Kappa Based on Expected Baserates and Observer Accuracy. From Bakeman & Yoder (2006).

Table 5.

Participant Demographics by Overall Sample

	(*M/SD*)	*n*	S	K
Age	29.94/3.57	62	-0.42	-0.63
ELC SS	76.21/26.40	62	0.61	-0.63
DayCare (Hours/Week)	21.77/19.59	62	0.01	-1.69†
Duration (months)	11.11/12.32	62	0.54	-1.43†
Gender (M/F)		44/18	0.95	-1.14
Race	1.31/0.69	62	2.58†	6.67†
1. Caucasian		49		
2. Black		9		
3. Hispanic		2		
4. Asian		2		
Parent Gender (M/F)	1.84/0.37	10/52	-1.89†	1.62†
Parent Behavior	2.68/0.20	62	-1.78†	1.97†
1. Passive		5		
2. Directive		10		
3. Neither		47		
Stranger Behavior	2.76/0.62	62	-2.37†	4.05†
1. Passive		6		
2. Directive		3		
3. Neither		53		
Overall ERAA	9.88/3.69	62	0.54	-0.29
Overall SAP-O	31.99/4.68	62	-0.69	-0.78
BRIEF-P GEC	57.98/13.88	60	0.44	-0.42
BRIEF-P Shifting	54.15/11.47	60	0.66	-0.27
ITSEA Dysregulation	53.54/22.92	61	0.71	-0.11
CARS2-ST	34.85/5.79	31	-0.45	1.54

Note. S = skewness; K = kurtosis.
* Correlation is significant at the .05 level; **Correlation is significant at the .01 level. † = significantly skewed/kurtotic.

Table 6.

Participant Demographics by Diagnostic Group

	t	ASD				TD			
		(*M/SD*)	*n*	S	K	(*M/SD*)	*n*	S	K
Age	4.41**	30.32/3.75	31	-0.75	-0.09	29.54/3.40	31	-0.08	-0.92
ELC SS	-62.00**	54.23/8.21	31	1.78†	2.31†	98.19/18.73	31	0.42	0.66
DayCare (Hours/Week)	-24.29**	11.71/16.39	31	1.03†	-0.51	31.84/17.40	31	-1.04†	-0.14
Duration (months)	-23.18**	5.00/9.37	31	2.17†	3.83†	17.23/11.98	31	-0.44	-1.49
Gender (M/F)	-11.89**	1.16/0.37	26/5	1.94†	1.87†	1.42/0.49	18/13	0.34	-2.02†
Race	0.18	1.32/0.65	31	1.94†	1.87†			2.65†	6.46†
Caucasian			23				26		
Black			7				2		
Hispanic			1				1		
Asian			0				2		
Parent Gender (M/F)	-0.68	1.81/0.40	6/25	-1.63†	0.70	1.87/0.34	4/27	-2.33†	3.65†
Parent Behavior	-0.61	2.55/0.68	31	-1.23†	0.36	2.81/.54	31	-2.82†	7.08†
4. Passive			3				2		
5. Directive			8				2		
6. Neither			20				27		
Stranger Behavior	-1.66	2.71/0.64	31	-2.08†	3.02†	2.81/.60	31	-2.87†	6.66†
4. Passive			3				3		
5. Directive			3				0		
6. Neither			25				28		
Overall ERAA	7.20**	12.37/3.22	31	0.19	-0.02	7.39/2.13	31	0.47	-1.00
Overall SAP-O	20.92**	29.06/4.54	31	0.04	-1.36	34.92/2.47	31	-1.15†	0.32
BRIEF-P GEC	26.37**	66.07/13.38	29	-0.23	0.29	50.42/9.44	31	0.76	0.07
BRIEF-P Shifting	12.43**	60.03/12.09	29	0.24	-1.24	48.64/7.57	31	0.10	-1.11
ITSEA Dysregulation	25.91**	64.71/26.05	31	-0.25	-0.45	42.00/10.68	30	1.52†	3.09†
CARS2-ST	--	34.85	31	-0.45	1.54	--	--	--	--

Note. S = skewness; K = kurtosis.
* Correlation is significant at the .05 level; **Correlation is significant at the .01 level. † = significantly skewed/kurtotic

Table 7

Measure Summary: ERAA, SAP-O, CARS2-ST

	ASD		TD		CARS2-ST Correlations (*ASD Sample Only*)		Differences	
	Parent (*M/SD*)	Stranger (*M/SD*)	Parent (*M/SD*)	Stranger (*M/SD*)	Parent	Stranger	*t*	*df*
CARS2-ST	34.85/5.79							
Overall ERAA	12.37/3.22		7.39/2.13		.51**		7.20**	60
ERAA Total	11.50/3.87	13.25/4.73	7.66/3.18	7.12/2.41	.38*	.30		
IP Average	4.84/1.53	4.99/1.51	3.52/1.79	3.07/1.58	.14	.05		
JP Average	3.13/1.84	4.38/2.49	1.82/0.83	1.62/0.84	.23	.24		
DP Average	3.52/1.45	3.87/1.85	2.32/1.63	2.43/1.13	.57**	.41*		
Number of Samples Total	13.42/4.03	13.58/3.88	12.32/3.53	10.61/4.14	-.34	-.26		
Number of IP Samples	4.61/2.39	4.58/2.38	4.32/2.44	2.74/1.77	-.01	-.26		
Number of JP Samples	2.90/1.96	3.87/2.57	5.55/2.47	4.94/2.38	-.12	-.20		
Number of DP Samples	5.90/2.80	5.13/2.60	2.45/1.31	2.94/2.21	-.40*	.05		
IP Time	178.19/93.91	188.77/99.93	187.03/105.24	128.61/92.05	.28	.22		
JP Time	198.74/147.85	232.90/134.24	346.45/109.63	403.16/155.91	.03	-.44*		
DP Time	348.32/137.91	290.77/141.21	196.48/133.12	183.55/123.69	-.02	-.03		
Wandering Time	725.26/78.79	712.45/80.87	173.48/67.59	184.68/84.24	-.36*	.51**		
RSB IP Time Spent	174.74/78.79	187.54/80.87	3.54/19.76	1.97/7.88	-.00	.24		
RSB JP Time Spent	17.81/35.90	21.23/41.12	0.16/0.90	5.61/25.68	.11	.11		
RSB DP Time Spent	15.87/40.94	21.29/42.84	0.26/1.45	0.00/0.00	.23	-.07		
Overall SAP-O	28.33/7.42		34.92/2.47		-.68**		-6.30**	60
SAP-O Total	29.26/5.92	28.87/5.43	35.68/2.31	34.16/4.05	-.56**	-.53**		
SAP-O Interaction Availability	8.65/3.89	7.84/3.67	12.32/1.94	11.19/2.90	-.60**	-.46**		
SAP-O Familiar Activities	5.32/1.11	5.42/1.09	5.94/0.57	5.81/0.75	-.16	-.13		
SAP-O New/Changing Situations	5.71/2.00	5.84/1.86	7.42/0.85	7.16/1.46	-.35	-.45*		
SAP-O Extreme Dysregulation	9.58/0.81	9.77/0.80	10.00/0.00	10.00/0.00	-.11	-.25		

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play. Higher scores on both the ERAA and CARS2-ST are indicative of more concerning symptoms, while lower scores on the SAP-O are indicative of more concerning symptoms. Wandering time refers to time not engaged in play. All time variables are referenced in seconds. Differences represent the assessed measurement difference among diagnostic groups.
* Correlation is significant at the .05 level; **Correlation is significant at the .01 level.

Table 8

ASD Measure Correlations: ERAA, SAP-O, ITSEA

	Dysregulation		Negative Emotionality		Sleep		Eating		Sensory		Clinical Significance	
	P	S	P	S	P	S	P	S	P	S	P	S
Overall ERAA	.13		.00		.03		.26		.17		-.24	
ERAA Total	-.21	.35	-.26	.22	-.10	.13	-.01	.36*	.01	.23	-.28	-.09
IP Average	.43*	.27	-.35	.24	-.28	.08	-.27	.31	-.20	.17	-.16	-.05
JP Average	-.09	.28	-.19	.13	-.02	.09	.08	.33	.12	.23	-.29	-.07
DP Average	-.00	.30	-.08	.17	.05	.13	.16	.22	.07	.15	-.23	-.09
Number of Samples Total	-.15	-.33	-.13	-.26	-.15	-.22	-.20	-.16	.01	-.08	-.25	-.11
Number of IP Samples	.19	-.07	-.08	-.08	-.06	-.06	-.06	-.01	-.05	-.07	-.07	-.15
Number of JP Samples	.04	.39*	-.00	-.30	-.03	-.26	.03	-.26	-.00	-.25	-.06	-.10
Number of DP Samples	-.08	-.04	-.11	-.03	-.15	-.02	-.25	.04	.05	.19	-.26	.07
IP Time	-.13	.17	-.05	.12	-.01	.21	.01	.20	-.01	.08	.07	-.02
JP Time	.16	-.21	.15	-.10	.11	-.16	.16	-.22	-.05	-.18	.19	-.10
DP Time	-.05	.10	-.05	.10	-.12	.04	-.03	.14	.08	.14	-.21	.09
Wandering Time	-.07	-.04	-.13	-.16	.02	-.06	-.26	-.13	-.03	-.05	-.07	.04
RSB IP Time Spent	-.02	.36*	-.02	.25	.05	.35	-.06	.49**	.25	.42*	-.10	.01
RSB JP Time Spent	.15	-.06	.07	-.11	.05	-.06	.23	.02	.11	-.15	-.05	-.16
RSB DP Time Spent	-.27	.12	-.06	-.02	-.15	-.05	-.02	.26	-.17	.03	-.11	.02
Overall SAP-O	.01		-.01		-.00		-.17		-.16		-.01	
SAP-O Total	-.16	.20	-.19	.19	-.18	.19	-.25	-.03	-.33	.09	-.03	.03
SAP-O Interaction Availability	-.01	.10	-.06	.11	-.05	.00	-.08	-.16	-.12	-.03	.10	.07
SAP-O Familiar Activities	-.30	.06	.38*	.07	-.21	.18	-.13	-.04	-.21	.16	-.36*	-.13
SAP-O New/Changing Situations	-.12	.28	-.03	.26	-.18	.33	-.29	.22	-.40*	.21	.05	.12
SAP-O Extreme Dysregulation	-.44*	.17	-.52**	.06	-.35	.25	-.53**	.11	-.56**	.05	-.34	-.23

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play; P = Parent; S = Stranger. Higher scores on both the ERAA and ITSEA are indicative of more concerning symptoms, while lower scores on the SAP-O are indicative of more concerning symptoms. Wandering time refers to time not engaged in play and instead wandering the room not engaged. All time variables are

referenced in seconds. Only scales/indexes related specifically to dysregulation were included in the above table for the ITSEA, with the exception of Clinical Significance.

* Correlation is significant at the .05 level; **Correlation is significant at the .01 level.

Table 9

TD Measure Correlations: ERAA, SAP-O, ITSEA

	Dysregulation††		Negative Emotionality		Sleep		Eating		Sensory		Clinical Significance	
	P	S	P	S	P	S	P	S	P	S	P	S
Overall ERAA		.13		.15		.08		.16		.05		.03
ERAA Total	-.04	.29	.06	.19	-.02	.17	.02	.26	-.06	.18	-.10	.20
IP Average	.02	.29	.02	.24	.03	.15	-.04	.23	.10	.12	-.13	-.01
JP Average	-.06	.24	.04	.21	.07	.01	-.09	.23	-.11	.34	-.05	.49**
DP Average	-.07	.04	.07	-.09	-.11	.14	.13	.05	-.17	-.05	-.03	.06
Number of Samples Total	-.23	-.04	.00	-.04	-.13	-.13	-.00	.22	-.23	.07	-.08	.13
Number of IP Samples	-.03	.04	-.16	.06	.04	.04	.22	.12	-.13	-.03	.21	.12
Number of JP Samples	-.16	-.16	.19	-.24	-.14	-.11	-.03	.09	-.11	-.07	-.23	-.00
Number of DP Samples	-.21	.06	-.06	.13	-.12	-.16	-.33	.22	-.15	.23	-.14	.15
IP Time	.18	.33	.01	.23	.06	.37*	.48**	.18	.03	-.06	.38*	.19
JP Time	.08	-.10	.04	.00	.01	-.18	.03	-.00	.24	-.04	-.32	-.21
DP Time	-.09	.07	-.09	.02	.07	.01	-.41*	-.11	-.05	.25	-.01	.04
Wandering Time	-.20	-.28	.08	-.28	-.21	-.10	.01	-.03	-.28	-.24	-.05	.12
RSB IP Time Spent	.05	-.06	.20	.13	-.08	-.08	.15	.01	-.10	-.22	-.20	.22
RSB JP Time Spent	-.12	-.05	-.09	.02	-.08	.08	-.01	.03	.00	-.10	.06	.12
RSB DP Time Spent	.07	--	-.09	--	.01	--	-.16	--	.00	--	-.02	--
Overall SAP-O††		-.14		-.05		-.22		.13		.03		-.15
SAP-O Total	-.23	-.04	-.03	-.04	-.08	-.22	-.34	.35	-.12	.10	-.08	-.14
SAP-O Interaction Availability	-.06	.05	.07	.03	.04	-.15	-.20	.32	-.05	.16	-.05	-.16
SAP-O Familiar Activities	-.37*	-.29	-.28	-.04	-.32	-.49**	-.14	.17	-.10	-.01	-.01	.08
SAP-O New/Changing Situations	-.27	-.06	-.05	.14	-.09	-.06	-.27	.26	-.15	-.02	-.09	-.11
SAP-O Extreme Dysregulation	--	--	--	--	--	--	--	--	--	--	--	--

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play; P = Parent; S = Stranger. Higher scores on both the ERAA and ITSEA are indicative of more concerning symptoms, while lower scores on the SAP-O are indicative of more concerning symptoms. Wandering time refers to time not engaged in play and instead wandering the room not engaged. All time variables are in seconds. Only scales/indexes related to dysregulation were included in the above table for the ITSEA.
* Correlation is significant at the .05 level; **Correlation is significant at the .01 level. †† = Log transformations were performed on these variables, but found to produce close to identical results.

Table 10

All Groups Measure Correlations: ERAA, SAP-O, ITSEA

	Dysregulation		Negative Emotionality		Sleep		Eating		Sensory		Clinical Significance	
	P	S	P	S	P	S	P	S	P	S	P	S
Overall ERAA	.42**		.39**		.28*		.40**		.40**		.15	
ERAA Total	.11	.54**	.14		.12		.17		.21		.01	.23
IP Average	-.02	.45**	.05	.45**	-.00	.26*	-.02	.37**	.09	.34**	.02	.17
JP Average	.14	.49**	.12	.42**	.15	.29*	.21	.45**	.26*	.44**	-.02	.26*
DP Average	.16	.40**	.18	.32*	.14	.27*	.23	.31*	.16	.28*	.02	.12
Number of Samples Total	-.05	-.01	.03	.05	-.06	-.02	-.07	.05	.04	.13	-.10	.13
Number of IP Samples	-.07	.16	-.03	.19	.01	.12	.01	.14	-.02	.13	.09	.11
Number of JP Samples	-.27*	-.36**	-.24	-.33**	-.23	.26*	-.17	-.24	.25*	-.26	-.30*	-.13
Number of DP Samples	.25	.19	.28*	.24	.13	.12	.04	.19	.30*	.34**	.07	.24
IP Time	-.04	.31*	-.04	.27*	-.01	.30*	.05	.25	-.01	.17	.19	.17
JP Time	-.15	-.37**	-.19	-.32*	-.12	-.30*	-.07	-.29*	-.22	-.32*	-.19	-.31*
DP Time	.20	.26**	.22	.26*	.13	.17	.12	.21	.25*	.30*	.08	.19
Wandering Time	-.06	-.09	-.03	-.15	-.01	-.16	-.16	-.09	-.07	-.08	-.04	.07
RSB IP Time Spent	.11	.42**	.15	.36**	.12	.40**	.04	.54**	.27*	.46**	-.02	.14
RSB JP Time Spent	.25	.06	.19	.05	.14	.03	.30*	.09	.21	-.02	.07	.02
RSB DP Time Spent	-.06	.26*	.12	.17	-.02	.08	.09	.34**	-.00	.18	.04	.14
Overall SAP-O	-.33*		-.36**		-.26*		-.33*		-.37**		-.27*	
SAP-O Total	-.41**	-.14	-.44**	-.18	-.34**	-.10	-.39**	-.16	-.49**	-.15	-.25	-.21
SAP-O Interaction Availability	-.27*	-.17	-.31*	-.19	-.22	-.19	-.25	-.24	-.32*	-.20	-.15	-.19
SAP-O Familiar Activities	-.41**	-.12	-.47**	-.07	-.32*	-.02	-.23	-.09	-.31*	.01	-.34**	-.12
SAP-O New/Changing Situations	-.35**	-.03	-.30*	-.09	-.32*	.06	-.40**	.04	-.51**	-.04	-.17	-.11
SAP-O Extreme Dysregulation	-.50**	.03	-.56**	-.07	-.42**	.14	-.58**	.03	-.60**	-.05	-.36**	-.23

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play; P = Parent; S = Stranger. Higher scores on the ERAA and ITSEA are indicative of more concerning symptoms, while lower scores on the SAP-O are indicative of more concerning symptoms. Wandering time refers to time not engaged in play. Only scales/indexes related specifically to dysregulation were included in the above table for the ITSEA.

* Correlation is significant at the .05 level; **Correlation is significant at the .01 level.

Table 11

ITSEA and CARS2-ST Correlations

	TD		ASD		CARS2-ST Correlation (*ASD Sample Only*)	Fisher's r-to-z Transformation Analysis	
	M	*SD*	*M*	*SD*		ERAA	SAP-O
Externalizing SS	46.53	7.46	58.81	23.77	.05	1.63	2.92**
Impulsivity	0.67	0.32	0.91	0.51	.00	1.81	3.10**
Aggression	0.43	0.24	1.43	2.17	-.03	1.70	2.99**
Peer Aggression	0.14	0.20	0.31	0.41	.17	1.17	2.46*
Internalizing SS	48.4	9.41	59.03	25.74	.07	1.55	2.84**
Withdrawal	0.07	0.09	0.81	0.89	.13	1.32	2.61**
Fear	0.21	0.28	0.55	0.65	.06	1.59	2.88**
Anxiety	0.27	0.20	0.61	0.70	.05	1.63	2.92**
Separation Distress	0.77	0.37	0.96	0.66	-.06	1.59	2.88**
Inhibition	0.95	0.48	3.40	6.73	-.03	1.70	2.99**
Dysregulation SS	42.00	10.68	64.71	26.05	.01	1.78	3.06**
Negative Emotionality	0.50	0.26	1.06	0.55	-.02	1.74	3.03**
Sleep	0.39	0.45	1.25	1.46	-.03	1.70	2.99**
Eating	0.45	0.28	1.44	1.85	.15	1.25	2.54*
Sensory	0.28	.27	0.82	0.70	.05	1.63	2.92**
Competence SS	51.57	13.59	33.23	24.64	-.11	1.40	2.69**
Compliance	1.49	.36	1.14	0.45	.07	1.55	2.84**
Attention	1.53	0.40	1.20	.52	-.04	1.66	2.95**
Mastery Motivation	1.67	0.36	2.64	3.21	.02	1.74	3.03**
Imitation/Play	1.60	0.38	1.13	0.92	-.09	1.48	2.76**
Empathy	1.44	0.45	0.53	0.56	-.09	1.48	2.76**
Prosocial	1.39	0.53	0.63	0.73	-.26	0.82	2.11*
Maladaptive	0.06	0.08	0.77	1.49	-.07	1.55	2.84**
Social Relatedness	1.71	0.23	3.69	5.09	-.08	1.51	2.88**
Atypical	0.17	0.16	1.92	3.45	-.01	1.78	3.06**
Clinical Significance	0.43	0.21	0.61	0.26	-.04	1.66	2.95**
CARS2-ST	--	--	34.85	5.79	--	--	--

Note. CARS2-ST Correlations represent ASD sample only. Fisher's r-to-z Transformation Analysis refers to the comparison of the ERAA/CARS2 correlations to the respective scale of the ITSEA/CARS2 correlations. Higher scores on the ERAA, CARS2-ST and ITSEA are indicative of more concerning symptoms, while lower scores on the SAP-O are indicative of more concerning symptoms.

* Correlation is significant at the .05 level; **Correlation is significant at the .01 level.

Table 12

ERAA Partial Correlations, Controlling for BRIEF-P GEC

	CARS2-ST Correlation	
	Parent	Stranger
Overall ERAA	.48*	
ERAA Total	.42*	.26
IP Average	.33	-.12
JP Average	.31	.28
DP Average	.42*	.35
Number of Samples Total	-.20	-.22
Number of IP Samples	.26	-.09
Number of JP Samples	-.03	-.16
Number of DP Samples	-.47*	-.10
IP Time	.45*	.31
JP Time	-.09	-.41*
DP Time	-.10	-.13
Wandering Time	-.19	.53**
RSB IP Time Spent	.11	.12
RSB JP Time Spent	-.06	.02
RSB DP Time Spent	.13	-.09
Overall SAP	-.65**	
SAP Total	-.58**	-.48**
SAP Interaction Availability	-.59**	-.41*
SAP Familiar Activities	-.22	-.04
SAP New/Changing Situations	-.38*	-.45*
SAP Extreme Dysregulation	-.17	-.28

Note. ASD Sample only. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play. Higher scores on both the ERAA and CARS2-ST are indicative of more concerning symptoms, while lower scores on the SAP-O are indicative of more concerning symptoms. Wandering time refers to time not engaged in play and instead wandering the room not engaged. All time variables are referenced in seconds. Differences represents the assessed measurement difference among diagnostic groups.
* Correlation is significant at the .05 level; **Correlation is significant at the .01 level.

Table 13

ITSEA Partial Correlations, Controlling for BRIEF-P GEC

	CARS2-ST Partial Correlation (*ASD Sample Only*)	Fisher's r-to-z Transformation Analysis	
		ERAA	SAP-O
Externalizing SS	-.04	1.81	2.75**
Impulsivity	-.11	1.54	2.49**
Aggression	.00	1.96	2.90**
Peer Aggression	.13	1.47	2.41*
Internalizing SS	.04	1.81	2.75**
Withdrawal	.10	1.58	2.53*
Fear	-.05	1.77	2.71**
Anxiety	.05	1.77	2.71**
Separation Distress	-.01	1.92	2.86**
Inhibition	.04	1.81	2.75**
Dysregulation SS	-.09	1.62	2.56*
Negative Emotionality	-.06	1.73	2.68**
Sleep	.01	1.92	2.86**
Eating	.16	1.35	2.30*
Sensory	-.02	1.88	2.83*
Competence SS	-.05	1.77	2.71**
Compliance	.02	1.88	2.83*
Attention	-.03	1.84	2.79**
Mastery Motivation	.06	173	2.68**
Imitation/Play	-.01	1.92	2.86**
Empathy	-.03	1.84	2.79**
Prosocial	-.06	1.73	2.68**
Maladaptive	.04	1.81	2.75**
Social Relatedness	.14	1.43	2.37*
Atypical	.00	1.96	2.90**
Clinical Significance	-.14	1.43	2.37*

Note. CARS2-ST Correlations represent ASD sample only. Higher scores on the ERAA, CARS2-ST, and ITSEA are indicative of more concerning symptoms, while lower scores on the SAP-O are indicative of more concerning symptoms. Fisher's r-to-z Transformation Analysis refers to the comparison of the ERAA/CARS2 correlations to the respective scale of the ITSEA/CARS2 correlations.
* Correlation is significant at the .05 level; **Correlation is significant at the .01 level.

Table 14

ERAA Construct and Social Environment

	M	*df*	F	*p*	η^2_p
Interactions					
Play Context * Play Partner * Diagnosis		3	4.08	.007**	.008
Play Partner * Diagnosis		1	28.11	.000**	.017
Play Context * Diagnosis		3	35.09	.000**	.062†
Play Context * Play Partner		3	3.36	.018*	.006
Pairwise Comparisons via Tukey HSD					
IP vs. JP	4.11/2.74			<.001**	
IP vs. DP	4.11/3.04			<.001**	
JP vs. DP	2.74/3.04			.05	

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play
*Significant at the .05 level; **significant at the .01 level; †Medium effect size.

Table 15.

Correlations between ERAA and SAP-O.in Overall Sample

	1	2	3	4	5	6	7	8	9	10	11	12
1. ERAA Overall	1											
2. SAP-O Overall	-.67**	1										
3. SAP Parent Total	-.63**	.86**	1									
4. SAP Parent Availability †	-.60**	.80**	.94**	1								
5. SAP Parent Familiar †	-.32*	.46**	.54**	.41**	1							
6. SAP Parent New Situations†	-.51**	.68**	.77**	.56**	.22	1						
7. SAP Parent Extreme Dysreg. †	-.23	.42**	.54**	.37**	.27*	.45**	1					
8. SAP Stranger Total	-.51**	.85**	.46**	.43**	.24	.38**	.18	1				
9. SAP Stranger Availability †	-.52**	.80**	.44**	.41**	.21	.41**	.13	.92**	1			
10. SAP Stranger Familiar †	-.24	.41**	.07	.02	.21	.08	-.03	.62**	.46**	1		
11. SAP Stranger New Situations†	-.35**	.64**	.35**	.35**	.18	.22	.16	.74**	.49**	.08	1	
12. SAP Stranger Extreme Dysreg†	-.04	.29*	.28	.25	.04	.19	.40**	.21	.03	-.03	.18	1
13. ERAA Parent Total	.80**	-.60**	-.59**	-.57**	-.30*	-.49**	-.15	-.44**	-.44**	-.20	-.30	-.05
14. ERAA Parent IP Average†	.57**	-.42**	-.40**	-.40**	-.27*	-.30*	-.04	-.32*	-.34**	-.02	-.24	-.03
15. ERAA Parent JP Average†	.68**	-.56**	-.51**	-.47**	-.11	-.54**	-.15	-.45**	-.46**	-.32*	-.23	.06
16. ERAA Parent DP Average†	.68**	-.48**	-.52**	-.51**	-.34	-.37**	-.19	-.30*	-.27*	-.16	-.26*	-.03
17. ERAA Parent Wandering Time	-.07	.10	.09	-.09	-.12	-.11	.01	.27*	.23	.30*	.19	-.01
18. ERAA Parent RSB Time	.59**	-.44**	-.09	-.41**	-.10	-.39**	.03	-.35**	-.35**	-.13	-.29*	.08
19. ERAA Parent Sample #	-.00	.07	-.03	.09	.11	.05	-.01	.14	.13	.25	.10	.19
20. ERAA Stranger Total	.87**	-.52**	-.47**	-.45**	-.24	-.36**	-.22	-.42**	-.42**	-.20	-.29*	-.01
21. ERAA Stranger IP Average†	.66**	-.44**	-.43**	-.48**	-.14	-.22	-.25*	-.32*	-.26*	-.19	-.30*	-.15
22. ERAA Stranger JP Average†	.73**	-.44**	-.36**	-.29*	-.25	-.36**	-.17	-.38**	-.42**	-.18	-.21	.03
23. ERAA Stranger DP Average†	.78**	-.42**	-.39**	-.38**	-.20	-.31*	-.13	-.33**	-.36**	-.12	-.22	.08

24. ERAA Stranger Wandering	.20	-.23	.18	.20	.28*	-.09	.02	-.22	-.19	-.07	-.20	-.10
25. ERAA Stranger RSB Time	.51**	-.27*	-.13	-.21	-.11	-.40**	-.08	-.17	-.23	-.11	-.03	.09
26. ERAA Stranger Sample #	.10	-.16	-.12	-.14	-.12	-.04	.02	-.14	-.14	-.03	-.11	-.05

Note. Higher scores on the ERAA are indicative of more concerning symptoms, while lower scores on the SAP-O are indicative of more concerning symptoms.

* Correlation is significant at the .05 level; **Correlation is significant at the .01 level. †Measure Subscales

Table 16.

Structured and Unstructured Play Contexts

Paired Sample	Overall			ASD			TD		
	Pair 1 *M/SD*	Pair 2 *M/SD*	t	Pair 1 *M/SD*	Pair 2 *M/SD*	t	Pair 1 *M/SD*	Pair 2 *M/SD*	t
Stranger IP Average vs. IP Structured Sample	4.03/1.81	4.24/2.45	0.89	4.99/1.51	4.94/2.10	-0.17	3.55/2.62	3.07/1.58	1.48
Stranger DP Average vs. DP Structured Sample	3.15/1.69	3.76/2.77	-2.26*	3.87/1.85	4.65/3.18	-1.67	2.43/1.13	2.87/1.98	-1.58
Parent IP Average vs. IP Structured Sample	4.18/1.78	4.45/2.34	1.47	4.84/1.53	5.13/2.45	1.07	3.52/1.79	3.77/2.05	0.99
Parent DP Average vs. DP Structured Sample	2.92/1.65	3.47/2.49	-2.13*	3.52/1.45	4.23/2.60	-1.48	2.32/1.63	2.71/2.15	-2.00
Stranger JP Average vs. DP Structured Sample	3.00/2.31	3.76/2.77	-2.28*	4.38/2.45	4.65/3.18	-0.48	1.62/.84	2.87/1.98	-3.46**
Parent JP Average vs. DP Structured Sample	2.47/1.56	3.47/2.49	3.22**	3.13/1.84	4.23/2.60	2.09*	1.82/.83	2.71/2.15	2.66*

Note. IP Structured Sample represents the structured ignore task either at the beginning or middle of the play sample. DP Structured Sample represents the disruptive play sample unique to the clean-up routine. Higher scores on the ERAA are indicative of more concerning symptoms.
*Significant at the .05 level; **significant at the .01 level

Table 17.

ERAA with Structured Constructs: Overall Sample

	M	*df*	F	*p*	η^2_p
Interactions					
Play Context * Play Partner * Diagnosis		3	2.57	.05	.005
Play Partner * Diagnosis		1	9.06	.003**	.006
Play Context * Diagnosis		3	19.90	.000**	.036
Play Context * Play Partner		3	2.25	.08	.004
Pairwise Comparisons via Tukey HSD					
IP vs. JP	4.35/2.74			<.001**	
IP vs. DP	4.35/3.61			<.001**	
JP vs. DP	2.74/3.61			<.001**	

Note. Higher scores on the ERAA are indicative of more concerning symptoms. Structured Contexts refers to the structured ignore task of independent play and the structured clean-up routine of disruptive play. Significant main effects existed for Play Context, Play Partner, and Diagnosis at less than the .01 alpha level, but these were not reported in lieu of the interaction effects. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play
*Significant at the .05 level; **significant at the .01 level

Table 18

Altered Structured Constructs Means

	ASD		TD	
	Parent	Stranger	Parent	Stranger
	(*M/SD*)	(*M/SD*)	(*M/SD*)	(*M/SD*)
Overall ERAA	13.23/5.36		8.04/3.52	
ERAA Total	4.80/3.52	5.37/3.83	3.19/2.58	3.09/2.64
IP Average	5.13/2.42	4.94/2.07	3.77/2.02	3.55/2.59
JP Average	3.13/1.81	4.38/2.46	1.82/0.82	1.62/0.83
DP Average	4.23/2.57	4.65/3.14	2.71/2.12	2.87/1.96

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play. Higher scores on the ERAA are indicative of more concerning symptoms. Structured Contexts refers to the structured ignore task of independent play and the structured clean-up routine of disruptive play.

Table 19.

ERAA with Structured Contexts: Covariates of Gender and Directiveness of Partner

	df	F	*p*	η^2_p
Interactions				
Play Context * Play Partner * Diagnosis	3	2.68	.04*	.005
Play Partner * Diagnosis	1	4.93	.03*	.003
Play Context * Diagnosis	3	18.87	.000**	.035
Play Context * Play Partner	3	2.14	.09	.004
Main Effects				
Partner Gender	1	16.50	.000**	.010
Adult Behavior	1	3.88	.04*	.002

Note. Significant main effects existed for Play Context, Play Partner, and Diagnosis at less than the .01 alpha level, but these were not reported in lieu of the interaction effects. Structured Contexts refers to the structured ignore task of independent play and the structured clean-up routine of disruptive play. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play.

*Significant at the .05 level; **significant at the .01 level

Table 20.
Play Context Correlations – Stranger Context, ASD Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Overall	1												
2. IP	.56**	1											
3. IP Sit. Mod.	.20	.39*	1										
4. IP Att. Deploy	.60**	.65**	.36*	1									
5. IP Response Mod.	.23	.47**	.04	.39*	1								
6. JP	.89**	.20	.10	.43*	.05	1							
7. JP Sit. Mod.	.48**	.26	.38*	.40*	.11	.52**	1						
8. JP Att. Deploy	.72**	.43*	.37*	.58**	.21	.73**	.61**	1					
9. JP Response Mod.	.43*	-.05	-.10	.13	-.01	.60**	.24	.25	1				
10. DP	.91**	.35	.07	.43*	.14	.76**	.31	.50**	.32	1			
11. DP Sit. Mod.	.46**	.13	.50**	.27	-.11	.45*	.51**	.44*	.18	.48**	1		
12. DP Att. Deploy	.86**	.29	-.02	.47**	.13	.78**	.40*	.53**	.44*	.91**	.39*	1	
13. DP Response Mod.	.38*	.34	.07	.19	.54**	.14	.05	.15	.07	.49**	.05	.27	1

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play.
*Significant at the .05 level; **significant at the .01 level

Table 21.
Play Context Correlations – Parent Context, ASD Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Overall	1												
2. IP	.74**	1											
3. IP Sit. Mod.	.44*	.65**	1										
4. IP Att. Deploy	.61**	.80**	.39*	1									
5. IP Response Mod.	.40*	.71**	.35	.43*	1								
6. JP	.85**	.40*	.17	.39*	.09	1							
7. JP Sit. Mod.	.57**	.44*	.30	.27	.24	.45*	1						
8. JP Att. Deploy	.57**	.23	.17	.24	-.02	.74**	.02	1					
9. JP Response Mod.	.16	.05	-.06	-.05	-.03	.23	.04	-.02	1				
10. DP	.82**	.43*	.28	.30	.19	.57**	.48**	.36*	.08	1			
11. DP Sit. Mod.	.65**	.53**	.63**	.45*	.17	.51**	.56**	.33	.02	.53**	1		
12. DP Att. Deploy	.73**	.29	.12	.16	.03	.65**	.53**	.39*	.26	.81**	.38*	1	
13. DP Response Mod.	.38*	.19	.11	.14	.21	.14	.33	.00	-.17	.63**	.29	.47**	1

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play.
*Significant at the .05 level; **significant at the .01 level

Table 22.
Play Context Correlations – Stranger Context, Typical Development Sample

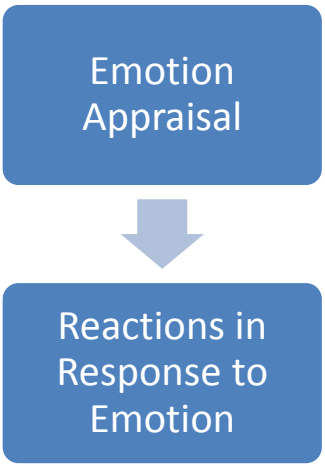
	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Overall	1												
2. IP	.79**	1											
3. IP Sit. Mod.	.60**	.82**	1										
4. IP Att. Deploy	.68**	.81**	.58**	1									
5. IP Response Mod.	.36	.59**	.31	.18	1								
6. JP	.54**	.18	.11	.18	-.03	1							
7. JP Sit. Mod.	.25	.30	.41*	.12	.18	.43*	1						
8. JP Att. Deploy	.36*	-.01	.21	.09	-.20	.82**	.17	1					
9. JP Response Mod.	.31	.19	.14	.22	.18	.65**	.15	.26	1				
10. DP	.63**	.16	.05	.18	-.04	.17	-.20	.17	-.08	1			
11. DP Sit. Mod.	.28	.38*	.21	.26	.32	.21	.31	.14	.03	-.10	1		
12. DP Att. Deploy	.39*	.10	.00	.20	-.13	.39*	-.03	.31	.30	.40*	-.18	1	
13. DP Response Mod.	.48**	.20	.12	.25	.07	.10	-.23	.13	.07	.68**	-.18	-.02	1

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play.
*Significant at the .05 level; **significant at the .01 level

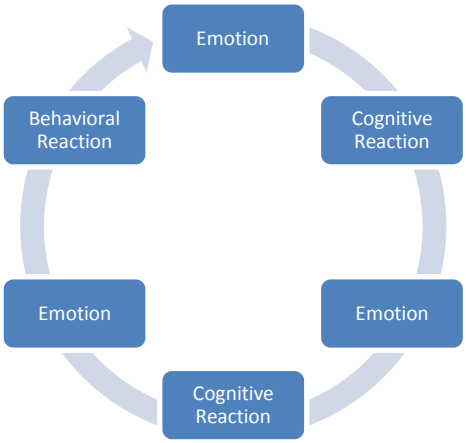
Table 23.
Play Context Correlations – Parent Context, Typical Development Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Overall	1												
2. IP	.79**	1											
3. IP Sit. Mod.	.46**	.63**	1										
4. IP Att. Deploy	.65**	.89**	.44*	1									
5. IP Response Mod.	.65**	.75**	.15	.58**	1								
6. JP	.57**	.23	.25	.16	.15	1							
7. JP Sit. Mod.	.65**	.54**	.66**	.40*	.19	.54**	1						
8. JP Att. Deploy	.55**	.21	.23	.15	.05	.58**	.28	1					
9. JP Response Mod.	.20	.12	-.00	.17	.08	.31	.23	-.01	1				
10. DP	.79**	.33	.08	.21	.36*	.36*	.39*	.55**	.11	1			
11. DP Sit. Mod.	.48**	.36*	.24	.23	.39*	.16	.31	.25	-.21	.46**	1		
12. DP Att. Deploy	.75**	-39*	.16	.16	.51**	.37*	.33	.55**	.16	.84**	.27	1	
13. DP Response Mod.	.28	-.03	-.09	.12	-.16	.04	.21	.15	.18	.56**	.04	.16	1

Note. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play.
*Significant at the .05 level; **significant at the .01 level



a) Cole et al. Model



b) Campos et al. Model

Figure 1. Comparison of different interpretations of the Two-Factor Theory (Cole at al.,2004; Campos et al., 2004). Model "a" makes it necessary to operationally define both emotion and behavioral reaction. Campos et al. (2004) states that the specific emotion and reaction are largely unobservable states and Model "b" allows for a variety of emotions to be felt. *Note:* Model "b" is still 2 factor in that it only contains two factors, emotion and reaction, that lead to the final observable emotion.

Figure 2. The Modal Model of Emotion Regulation (Gross & Thompson, 2007).

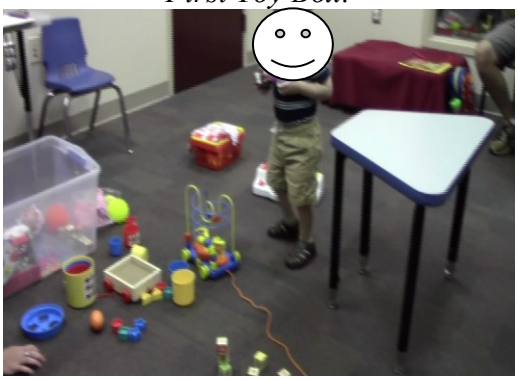
Toy Box 1
• Letter Blocks w/ Cart • Tambourine & Shaker • Shape Sorter • Baby Doll with supplies • Picnic Basket with Food • Twisty Maze • Tool Box • 3 Cars • 2 Squishy Balls • Bubbles • Necklaces

Toy Box 2
• Mr. Potato Head • 2 Microphones • Bowling Kit • Doll w/ Hair • Bag of Baby Toys • Phone • Pop-Up Toy • Stringing Beads • Stacking Bowls • Puzzle – Shapes & Numbers

Toy Box 3
• Blue Ball • Piglet • Puzzle – Animals • Ring Stacker • Cars & Race Track • Slinky • Nesting Cups • Wooden Blocks • Sunglasses • Playdoh • Slicing Fruit

Figure 3. Toy Box Contents.

First Toy Box:

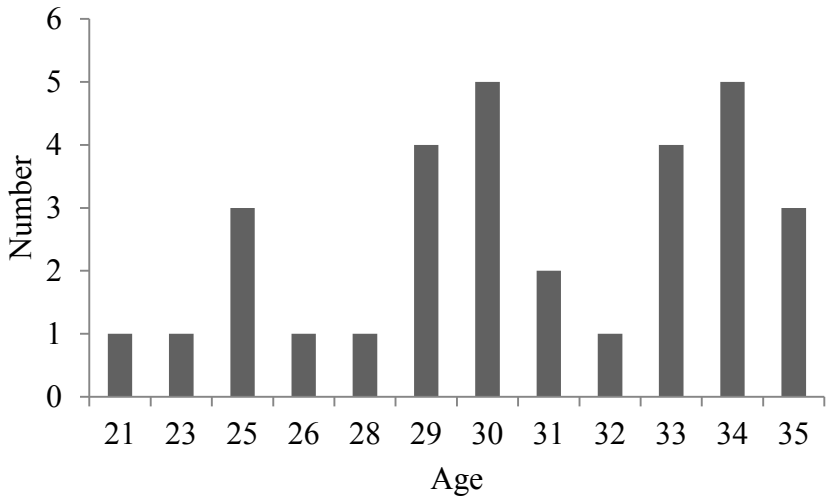


Second Toy Box:

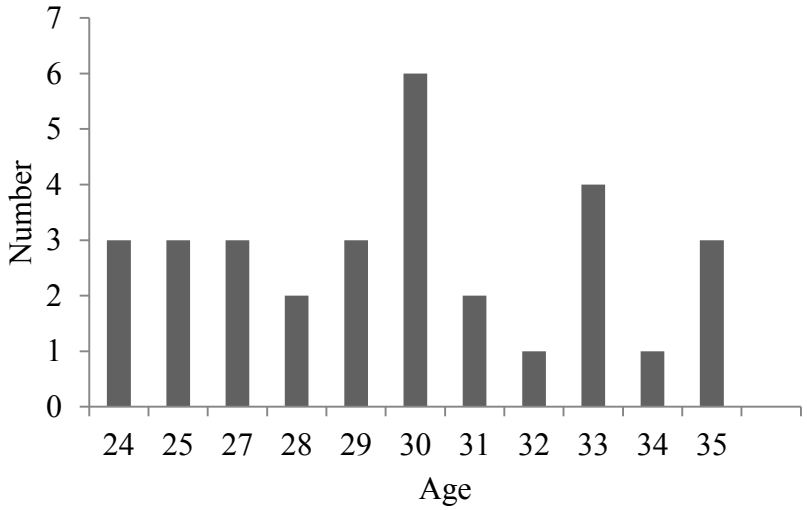
Third Toy Box:

Figure 4. Room Set-Up. The top picture shows a child playing with the first toy box, with the strangers hand in the lower-left corner and the parent sitting in the upper-right corner. The other two toy boxes are covered in the top-right with a burgundy blanket. The middle picture shows the child playing with the second toy box, as the parent completes the demographic form in the right side of the picture. The bottom picture shows the child playing with their parent using the third toy box.

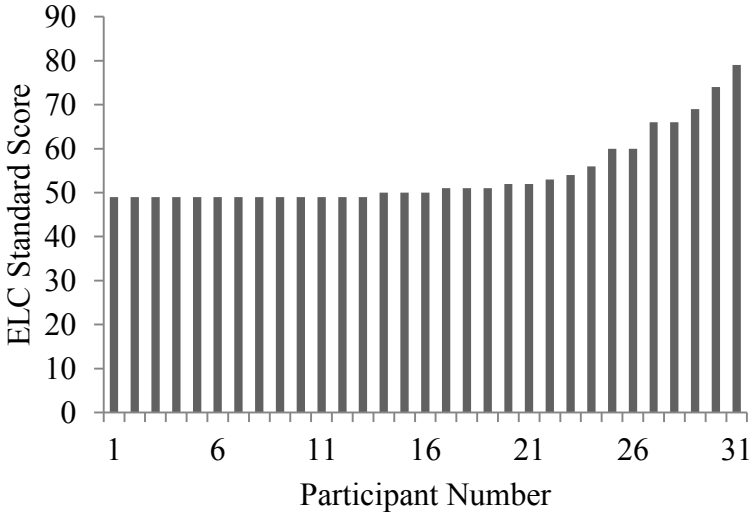
a) Age Skewness for ASD Sample



b) Age Skewness for TD



c) ELC Skewness for ASD



d) ELC Skewness for TD

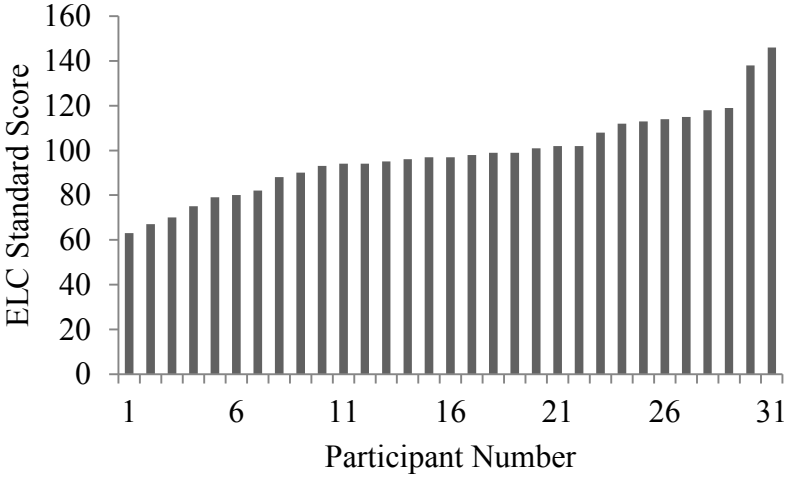


Figure 5. Participant Distribution.

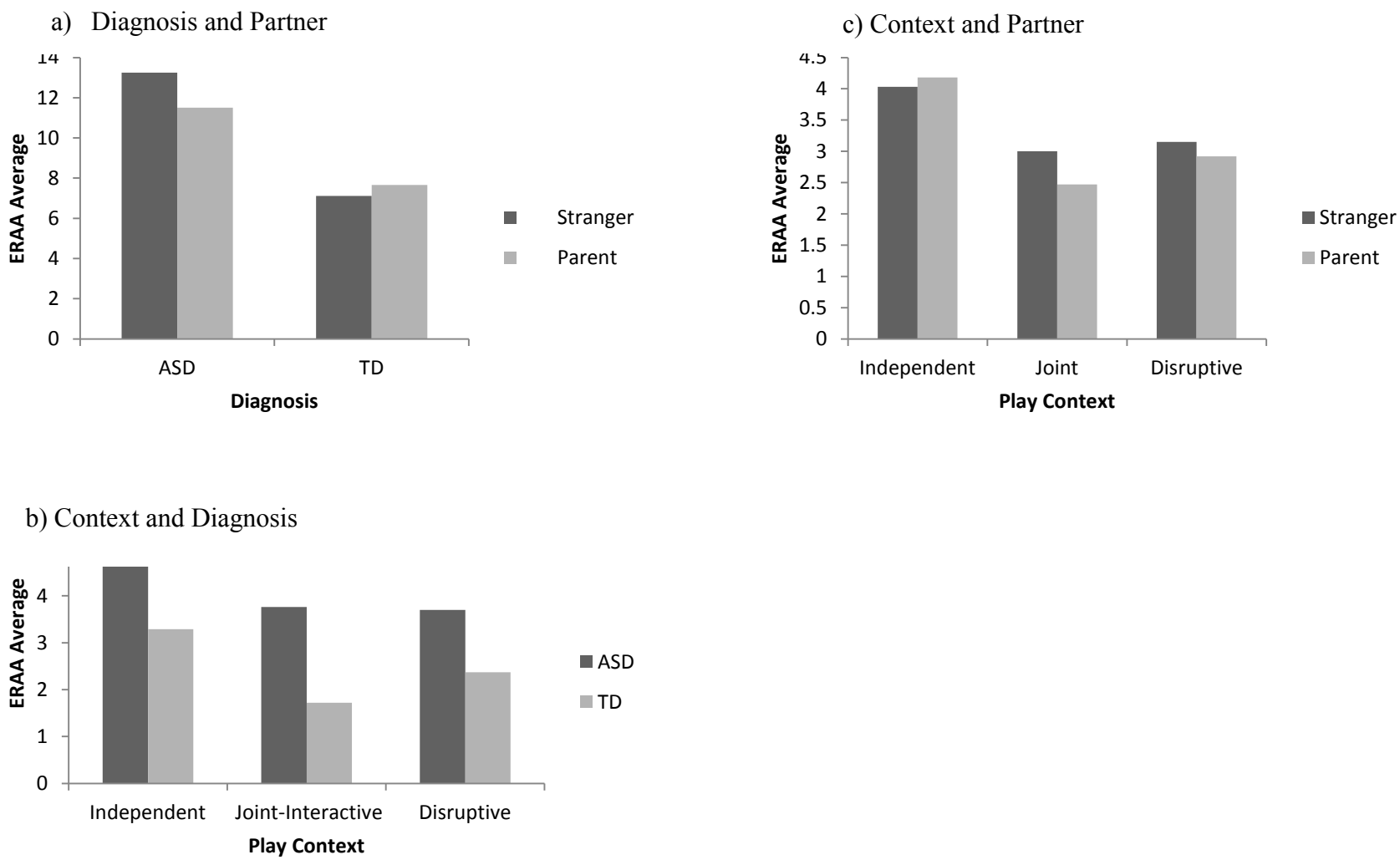
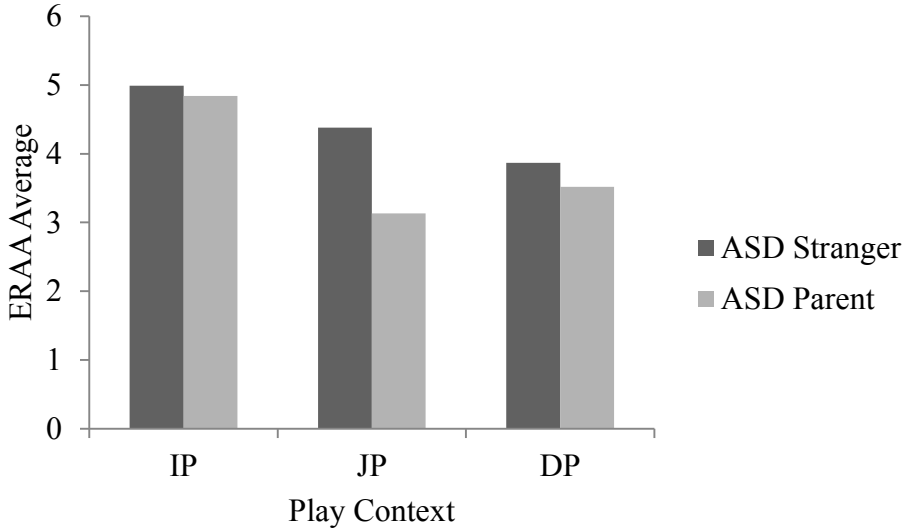


Figure 6. Hypothesis Five Interactions. Higher scores on the ERAA are indicative of more concerning symptoms



a) Children with Typical Development

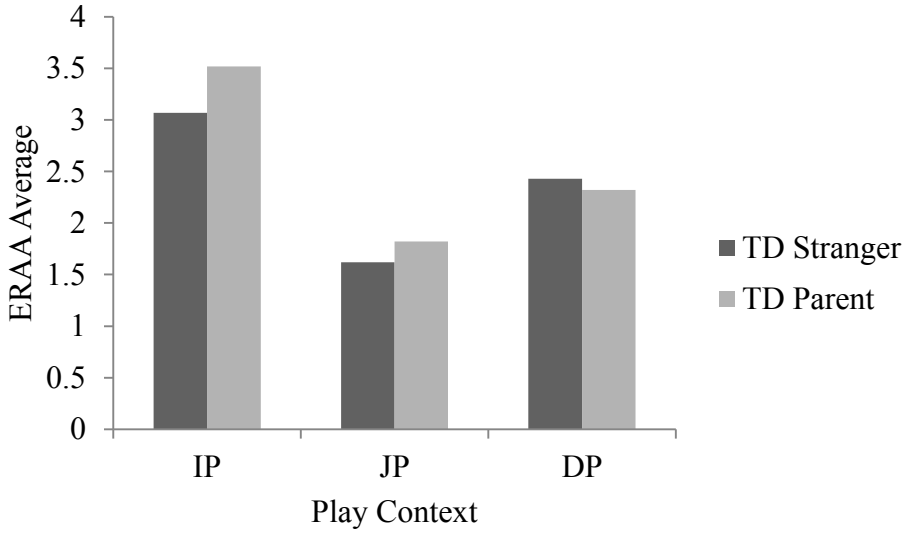


Figure 7. ERAA Means. IP = Independent Play; JP = Joint Interactive Play; DP = Disruptive Play. Higher scores on the ERAA are indicative of more concerning symptoms.

Appendix A

Emotion Regulation Assessment for ASD

Participant ID:_____ Adult Gender: **M** OR **F** ***Parent*** OR ***Stranger*** Coder Initials:_____

Introductory Play

1. Does the child go to parent? ***Yes*** ***No***

2. What is the child's current Affect? ***Response Modulation***
   a. Affect is negatively heightened (crying, frowning, fearful).....3
      Affect Severity: 1 2 3 4 5
   b. Affect is flat.....2
      Affect Severity: 1 2 3 4 5
   c. Affect appears restricted (e.g., shy, wariness).....1
      Affect Severity: 1 2 3 4 5
   d. Affect is positively heightened (smiling, interested in new person).....0

3. Is the child engaging in repetitive behavior as defined by the ADOS? ***Repetitive BX***
   a. Yes; with self (bouncing, spinning, flapping).....2
      RSB Severity: 1 2 3 4 5
   b. Yes; with object (banging, wobbling, flapping, spinning).....1
      RSB Severity: 1 2 3 4 5
   c. No.....0
   If yes, for how long (in seconds):_____

Independent Play
With an adult within 3 feet of child

Time Start:_____ Time Finish:_____ Total Time:_____

4. Does the child go to parent? ***Yes*** ***No***

6. Does the ASD child notice presence of new person? ***Situation Modification***
   a. No Response to person.....3
   b. Yes, looks up, does not orient to person.....2
   c. Yes, looks up and orients to person, no eye contact.....1
   d. Yes, orients to and makes eye contact for at least 2 seconds with the person.....0

7. To what does the child shift attention to, upon the movement or approach of an adult?
   Attentional Deployment/Cognitive Change
   a. Child abandons activity, without selecting a replacement (i.e., wandering)……5
   b. Child shifts attention to another object/activity.....4
   c. Child remains focused on object/activity by moving it away from person 3
   d. Child remains focused on object/activity in same place 2
   e. Child watches person's action.....1
   f. Child engages with person.....0

8. Is there an affective change? ***Response Modulation***
   b. Yes, affect becomes negatively heightened (crying, frowning, fearful).....4
      Affect Severity: 1 2 3 4 5
   c. Yes, affect becomes flattened.....3
      Affect Severity: 1 2 3 4 5
   c. Yes, affect becomes restricted (e.g., shy, wariness).....2
      Affect Severity: 1 2 3 4 5
   d. No, affect remains the same from previous activity.....1
   e. Yes, affect becomes positively heightened (smiling, interested in new person)..... 0

9. Is the child engaging in repetitive behavior as defined by the ADOS? ***Repetitive BX***
   d. Yes; with self (bouncing, spinning, flapping).....2
      RSB Severity: 1 2 3 4 5
   e. Yes; with object (banging, wobbling, flapping, spinning).....1
      RSB Severity: 1 2 3 4 5
   f. No.....0
   If yes, for how long (in seconds):_____

Joint-Interactive Play

Time Start:_____ Time Finish:_____ Total Time:_____

10. Does the child leave the JIP interaction to join their parent? ***Yes*** ***No***
    Note: "Yes" ONLY applies if this is a Stranger session

11. Following intrusion, does the ASD child notice the actions of new person? ***Sit. Modification***
    a. No Response to person.....2
    b. Yes, looks toward and orients to person's action, no eye contact.....1
    c. Yes, orients to and makes eye contact for at least 2 seconds with the person.....0

12. Following interaction, does the child shift attention to person or object? ***Attn. Deployment & Cognitive Change***
    a. Child abandons activity without a replacement activity (i.e., wandering).....5
    b. Child shifts to another object/activity…….....4
    c. Child remains focused on object/activity by moving it away from person.....3
    d. Child remains focused on own object/activity and continues in parallel play.....2
    e. Child watches person's action for longer than 10 seconds.....1
    f. Child engages with person.....0

13. Following the intrusion of the novel person, is there an affective change? ***Response Modulation***
    a. Yes, affect becomes negatively heightened (crying, frowning, fearful).....4
       Affect Severity: 1 2 3 4 5
    b. Yes, affect becomes flattened.....3
       Affect Severity: 1 2 3 4 5
    c. Yes, affect becomes restricted (e.g., shy, wariness).....2
       Affect Severity: 1 2 3 4 5
    d. No, affect remains the same from previous activity.....1
    e. Yes, affect becomes positively heightened (smiling, interested in new person).....0

14. Is the child engaging in repetitive behavior? ***Repetitive BX***
    a. Yes; with self (bouncing, spinning, flapping) and not interacting with adult.....5
       RSB Severity: 1 2 3 4 5
    b. Yes; w/ object (banging, wobbling, flapping, spinning) and not interacting with adult….....4
       RSB Severity: 1 2 3 4 5
    c. Yes; with self (bouncing, spinning, flapping) and interacting with adult.....3
       RSB Severity: 1 2 3 4 5
    d. Yes; w/ object (banging, wobbling, flipping, spinning) and interacting with adult.....2
       RSB Severity: 1 2 3 4 5
    e. No; but not interacting with adult.....1
    e. No; interacting with adult.....0

    If yes, for how long (in seconds):_____

Disruptive Play

Time Start:_____ Time Finish:_____ Total Time:_____

15. Does the child leave the play area to join their parent? ***Yes*** ***No***
    Note: "Yes" ONLY applies if this is a Stranger session

16. Following intrusion, does the ASD child notice the actions of new person? ***Sit. Modification`***
    a. No Response to person.....2
    b. Yes, looks toward and orients to person's action, no eye contact.....1
    c. Yes, orients to and makes eye contact for at least 2 seconds with the person.....0

17. Following interruption, does the child shift attention to person or object? ***Attn. Deployment & Cog. Change***
    a. Child abandons activity without a replacement activity (i.e., wandering).....5
    b. Child shifts to another object/activity, but not of the adult's disruptive choice.....4
    c. Child remains focused on object/activity by moving it away from person.....3
    d. Child remains focused on own object/activity…….....2
    e. Child watches person's action for longer than 10 seconds.....1
    f. Child engages with person.....0

18. Following the interruption of the novel person, is there an affective change? ***Response Mod.***
    a. Yes, affect becomes negatively heightened (crying, frowning, fearful).....4
       Affect Severity: 1 2 3 4 5
    b. Yes, affect becomes flattened.....3
       Affect Severity: 1 2 3 4 5
    c. Yes, affect becomes restricted (e.g., shy, wariness).....2
       Affect Severity: 1 2 3 4 5
    d. No, affect remains the same from previous activity.....1
    e. Yes, affect becomes positively heightened (smiling, interested in new person).....0

19. Is the child engaging in repetitive behavior? ***Repetitive BX***
    a. Yes; with self (bouncing, spinning, flapping) and not interacting with adult.....5
       RSB Severity: 1 2 3 4 5
    b. Yes; w/ object (banging, wobbling, flapping, spinning) and not interacting with adult.....4
       RSB Severity: 1 2 3 4 5
    c. Yes; with self (bouncing, spinning, flapping) and interacting with adult.....3
       RSB Severity: 1 2 3 4 5
    d. Yes; with object (banging, wobbling, flipping, spinning) and interacting with adult.....2
       RSB Severity: 1 2 3 4 5
    e. No; but not interacting with adult.....1
    e. No; interacting with adult via gaze, vocalizations, or actions.....0
       If yes, for how long (in seconds):_____

IF THIS IS THE LAST CODE OF THE VIDEO:

Was the adult: a. Extremely Passive
b. Extremely Directive
c. Neither Overly Directive Nor Passive

CARS2-ST

Childhood Autism Rating Scale, Second Edition

Eric Schopler, Ph.D., Robert J. Reichler, M.D., and Barbara Rochen Renner, Ph.D.

wps. Test with Confidence

Standard Version Rating Booklet

Name: _____ Case ID Number: _____ Test date: _____

Gender: _____ Ethnic background: _____ Rater's name: _____ Date of birth: _____

Based on information from: _____ Age: _____ years _____ months

DIRECTIONS: After rating the 15 items, transfer the ratings from the inside pages to the corresponding spaces below. Sum the ratings to obtain the Total raw score, and indicate the corresponding Severity Group. Circle the Total raw score value in the table in the column labeled *All ages* and in the column that corresponds to the age of the person who has been rated. The number printed to the left of each value you have circled is the *T*-score.

SUMMARY

CATEGORY RATINGS

1. Relating to People ..... _____
   median = 2.5 *(3.0, 2.5)*
2. Imitation ..... _____
   median = 2.5 *(2.5, 2.0)*
3. Emotional Response ..... _____
   median = 3.0 *(3.0, 3.0)*
4. Body Use ..... _____
   median = 2.5 *(2.5, 2.5)*
5. Object Use ..... _____
   median = 2.5 *(2.5, 2.0)*
6. Adaptation to Change ..... _____
   median = 2.5 *(2.5, 2.5)*
7. Visual Response ..... _____
   median = 2.5 *(2.5, 2.0)*
8. Listening Response ..... _____
   median = 2.5 *(2.5, 2.0)*
9. Taste, Smell, and Touch Response and Use ..... _____
   median = 2.0 *(2.0, 2.0)*
10. Fear or Nervousness ..... _____
    median = 2.5 *(2.5, 2.5)*
11. Verbal Communication ..... _____
    median = 3.0 *(3.0, 3.0)*
12. Nonverbal Communication ..... _____
    median = 2.5 *(2.5, 2.0)*
13. Activity Level ..... _____
    median = 2.5 *(2.5, 2.0)*
14. Level and Consistency of Intellectual Response ..... _____
    median = 2.5 *(2.5, 2.5)*
15. General Impressions ..... _____
    median = 3.0 *(3.0, 3.0)*

Note. The numbers in parentheses are medians for individuals aged 2–12 or 13+, respectively.

Total raw score = [ ] *Note. SEM* = 0.68.

SEVERITY GROUP

☐ **Minimal Symptoms of Autism Spectrum Disorder**
(15–29.5; *15–27.5 for ages 13+*)

☐ **Mild-to-Moderate Symptoms of Autism Spectrum Disorder**
(30–36.5; *28–34.5 for ages 13+*)

☐ **Severe Symptoms of Autism Spectrum Disorder**
(37 and higher; *35 and higher for ages 13+*)

Symptom Level Compared to Individuals With Autism Spectrum Diagnoses

		Raw score		
Percentile	*T*-score	All ages	Ages 2–12	Ages 13 and older
	>70	>54	>54	>54
>97	70	54	54	54
97	69	53.5	53.5	52–53.5
	68	52–53	52.5–53	49.5–51.5
96	67	51–51.5	51.5–52	
95	66	50–50.5	51	
93	65	49.5	50–50.5	49
92	64	49	49.5	47.5–48.5
90	63	48–48.5	48.5–49	46–47
88	62	47–47.5	47.5–48	45–45.5
86	61	46.5	46.5–47	44–44.5
84	60	45.5–46	46	
82	59	44.5–45	45–45.5	43.5
79	58	44	44.5	43
76	57	43.5	44	42.5
72	56	42.5–43	43–43.5	42
69	55	42	42–42.5	41–41.5
65	54	41–41.5	41.5	40–40.5
62	53	40–40.5	40.5–41	39.5
58	52	39–39.5	39.5–40	38.5–39
54	51	38.5	39	37.5–38
50	50	37.5–38	38–38.5	36.5–37
46	49	37	37.5	35–36
42	48	36–36.5	36.5–37	34–34.5
38	47	35–35.5	35.5–36	33.5
35	46	34–34.5	35	33
31	45	33.5	34–34.5	32.5
28	44	33	33.5	31–32
24	43	32–32.5	32.5–33	30–30.5
21	42	31.5	32	29–29.5
19	41	30.5–31	31.5	27.5–28.5
16	40	30	30.5–31	26.5–27
14	39	28.5–29.5	30	26
12	38	27.5–28	29–29.5	25–25.5
10	37	26–27	28–28.5	23.5–24.5
8	36	25.5	26–27.5	23
7	35	24.5–25	25.5	21–22.5
6	34	24	24.5–25	20.5
5	33	23–23.5	24	
4	32	22.5	23.5	
3	31	21.5–22	23	
2	30	21	22–22.5	20
	29	20.5		
1	28		21.5	
<1	27	20	21	
	26		20.5	
	25		20	19.5
	24	19.5		
	23		19.5	
	22			
	21			
	20	19	19	
	<20	<19	<19	<19.5

Note. SEM = 2.7*T*.

W-472A 123456789

DIRECTIONS

For each category, use the space provided in the *Observations* section for taking notes concerning the behaviors relevant to that item. After you have finished observing the child, rate the behaviors relevant to each item by circling the number that corresponds to the statement that best describes the child. You may indicate that the child's behavior falls between two descriptions by circling ratings of 1.5, 2.5, or 3.5. Abbreviated rating criteria are presented for each item. See chapter 2 of the Manual for detailed rating criteria.

1. Relating to People

1 **No evidence of difficulty or abnormality in relating to people.** The child's behavior is appropriate for his or her age. Some shyness, fussiness, or annoyance at being told what to do may be observed, but not to an atypical degree.

1.5

2 **Mildly abnormal relationships.** The child may avoid looking the adult in the eye, avoid the adult or become fussy if interaction is forced, be excessively shy, not be as responsive to the adult as is typical, or cling to parents somewhat more than most children of the same age.

2.5

3 **Moderately abnormal relationships.** The child shows aloofness (seems unaware of adult) at times. Persistent and forceful attempts are necessary to get the child's attention at times. Minimal contact is initiated by the child.

3.5

4 **Severely abnormal relationships.** The child is consistently aloof or unaware of what the adult is doing. He or she almost never responds to or initiates contact with the adult. Only the most persistent attempts to get the child's attention have any effect.

2. Imitation

1 **Appropriate imitation.** The child can imitate sounds, words, and movements that are appropriate for his or her skill level.

1.5

2 **Mildly abnormal imitation.** The child imitates simple behaviors such as clapping or single verbal sounds most of the time; occasionally, imitates only after prodding or after a delay.

2.5

3 **Moderately abnormal imitation.** The child imitates only part of the time and requires a great deal of persistence and help from the adult; frequently imitates only after a delay.

3.5

4 **Severely abnormal imitation.** The child rarely or never imitates sounds, words, or movements even with prodding and assistance from the adult.

3. Emotional Response

1 **Age-appropriate and situation-appropriate emotional response.** The child shows the appropriate type and degree of emotional response, as indicated by a change in facial expression, posture, and manner.

1.5

2 **Mildly abnormal emotional response.** The child occasionally displays a somewhat inappropriate type or degree of emotional reaction. Reactions are sometimes unrelated to the objects or events surrounding him or her.

2.5

3 **Moderately abnormal emotional response.** The child shows definite signs of inappropriate type and/or degree of emotional response. Reactions may be quite inhibited or excessive and unrelated to the situation; child may grimace, laugh, or become rigid even though no apparent emotion-producing objects or events are present.

3.5

4 **Severely abnormal emotional response.** Responses are seldom appropriate to the situation; once the child gets in a certain mood, it is very difficult to change the mood. Conversely, the child may show wildly different emotions when nothing has changed.

4. Body Use

1 **Age-appropriate body use.** The child moves with the same ease, agility, and coordination as a normal child of the same age.

1.5

2 **Mildly abnormal body use.** Some minor peculiarities may be present, such as clumsiness, repetitive movements, poor coordination, or the rare appearance of more unusual movements.

2.5

3 **Moderately abnormal body use.** Behaviors that are clearly strange or unusual for a child of this age may include strange finger movements, peculiar finger or body posturing, staring or picking at the body, self-directed aggression, rocking, spinning, finger-wiggling, or toe-walking.

3.5

4 **Severely abnormal body use.** Intense or frequent movements of the type listed above are signs of severely abnormal body use. These behaviors may persist despite attempts to discourage them or involve the child in other activities.

5. Object Use

1 **Appropriate interest in, or use of, toys and other objects.** The child shows normal interest in toys and other objects appropriate for his or her skill level and uses these toys in an appropriate manner.

1.5

2 **Mildly inappropriate interest in, or use of, toys and other objects.** The child may show atypical interest in a toy or play with it in an inappropriately childish way (e.g., banging or sucking on the toy).

2.5

3 **Moderately inappropriate interest in, or use of, toys and other objects.** The child may show little interest in toys or other objects, or may be preoccupied with using an object or toy in some strange way. He or she may focus on some insignificant part of a toy, become fascinated with light reflecting off the object, repetitively move some part of the object, or play with one object exclusively.

3.5

4 **Severely inappropriate interest in, or use of, toys and other objects.** The child may engage in the same behaviors as above, with greater frequency and intensity. The child is difficult to distract when engaged in these inappropriate activities.

6. Adaptation to Change

1 **Age-appropriate adaptation to change.** While the child may notice or comment on changes in routine, he or she accepts these changes without undue distress.

1.5

2 **Mildly abnormal adaptation to change.** When an adult tries to change tasks, the child may continue the same activity or use the same materials.

2.5

3 **Moderately abnormal adaptation to change.** The child actively resists changes in routine, tries to continue the old activity, and is difficult to distract. He or she may become angry and unhappy when an established routine is altered.

3.5

4 **Severely abnormal adaptation to change.** The child shows severe reactions to change. If a change is forced, he or she may become extremely angry or uncooperative and respond with tantrums.

7. Visual Response

1 **Age-appropriate visual response.** The child's visual behavior is normal and appropriate for his or her age. Vision is used together with other senses as a way to explore a new object.

1.5

2 **Mildly abnormal visual response.** The child must be occasionally reminded to look at objects. The child may be more interested in looking at mirrors or lighting than are his or her peers, may occasionally stare off into space, or may also avoid looking people in the eye.

2.5

3 **Moderately abnormal visual response.** The child must be reminded frequently to look at what he or she is doing. He or she may stare into space, avoid looking people in the eye, look at objects from an unusual angle, or hold objects very close to the eyes.

3.5

4 **Severely abnormal visual response.** The child consistently avoids looking at people or certain objects and may show extreme forms of other visual peculiarities described above.

8. Listening Response

1 **Age-appropriate listening response.** The child's listening behavior is normal and appropriate for his or her age. Listening is used together with other senses.

1.5

2 **Mildly abnormal listening response.** There may be some lack of response or mild overreaction to certain sounds. Responses to sounds may be delayed, and sounds may need repetition to catch the child's attention. The child may be distracted by extraneous sounds.

2.5

3 **Moderately abnormal listening response.** The child's responses to sounds vary; often ignores a sound the first few times it is made; may be startled or cover ears when hearing some everyday sounds.

3.5

4 **Severely abnormal listening response.** The child overreacts and/or underreacts to sounds to an extremely marked degree, regardless of the type of sound.

9. Taste, Smell, and Touch Response and Use

1 **Normal use of, and response to, taste, smell, and touch.** The child explores new objects in an age-appropriate manner, generally by feeling and looking. Taste or smell may be used when appropriate. When reacting to minor everyday pain, the child expresses discomfort but does not overreact.

1.5

2 **Mildly abnormal use of, and response to, taste, smell, and touch.** The child may persist in putting objects in his or her mouth; may smell or taste inedible objects; may ignore or overreact to mild pain that a normal child would express as discomfort.

2.5

3 **Moderately abnormal use of, and response to, taste, smell, and touch.** The child may be moderately preoccupied with touching, smelling, or tasting objects or people. The child may either react too much or too little.

3.5

4 **Severely abnormal use of, and response to, taste, smell, and touch.** The child is preoccupied with smelling, tasting, or feeling objects more for the sensation than for normal exploration or use of the objects. The child may completely ignore pain or react very strongly to slight discomfort.

10. Fear or Nervousness

1 **Normal fear or nervousness.** The child's behavior is appropriate both to the situation and for his or her age.

1.5

2 **Mildly abnormal fear or nervousness.** The child occasionally shows too much or too little fear or nervousness compared to the reaction of a normal child of the same age in a similar situation.

2.5

3 **Moderately abnormal fear or nervousness.** The child shows either quite a bit more or quite a bit less fear than is typical even for a younger child in a similar situation.

3.5

4 **Severely abnormal fear or nervousness.** Fear persists even after repeated experience with harmless events or objects. It is extremely difficult to calm or comfort the child. The child may, conversely, fail to show appropriate regard for hazards that other children of the same age avoid.

11. Verbal Communication

1 **Normal verbal communication, age and situation appropriate.**

1.5

2 **Mildly abnormal verbal communication.** Speech shows overall retardation. Most speech is meaningful; however, some echolalia or pronoun reversal may occur. Some peculiar words or jargon may be used occasionally.

2.5

3 **Moderately abnormal verbal communication.** Speech may be absent. When present, verbal communication may be a mixture of some meaningful speech and some peculiar speech such as jargon, echolalia, or pronoun reversal. Peculiarities in meaningful speech include excessive questioning or preoccupation with particular topics.

3.5

4 **Severely abnormal verbal communication.** Meaningful speech is not used. The child may make infantile squeals, weird or animal-like sounds, or complex noises approximating speech, or may show persistent, bizarre use of some recognizable words or phrases.

12. Nonverbal Communication

1 **Normal use of nonverbal communication, age and situation appropriate.**

1.5

2 **Mildly abnormal use of nonverbal communication.** Immature use of nonverbal communication; may only point vaguely, or reach for what he or she wants, in situations where a typically developing same-age child may point or gesture more specifically to indicate what he or she wants.

2.5

3 **Moderately abnormal use of nonverbal communication.** The child is generally unable to express needs or desires nonverbally and cannot understand the nonverbal communication of others.

3.5

4 **Severely abnormal use of nonverbal communication.** The child uses only bizarre or peculiar gestures that have no apparent meaning and shows no awareness of the meanings associated with the gestures or facial expressions of others.

13. Activity Level

1 **Normal activity level for age and circumstances.** The child is neither more active nor less active than a normal child of the same age in a similar situation.

1.5

2 **Mildly abnormal activity level.** The child may either be mildly restless or somewhat "lazy" and slow moving at times. The child's activity level interferes only slightly with his or her performance.

2.5

3 **Moderately abnormal activity level.** The child may be quite active and difficult to restrain. He or she may have boundless energy and may not go to sleep readily at night. Conversely, the child may be quite lethargic and need a great deal of prodding to get him or her to move about.

3.5

4 **Severely abnormal activity level.** The child exhibits extremes of activity or inactivity and may even shift from one extreme to the other.

14. Level and Consistency of Intellectual Response

To rate this item, it is essential to read the expanded definitions in the Manual.

1 **Intelligence is normal and reasonably consistent across various areas.** The child is as intelligent as typical children of the same age and does not have any unusual intellectual skills or problems.

1.5 *The child has low intelligence (IQ score between 71 and 85) and does not have any unusual intellectual skills or problems.*

2 **Mildly abnormal intellectual functioning.** The child has very low intelligence (IQ score is 70 or lower) and his or her skills appear fairly evenly delayed across all areas.

2.5 *The child has very low intelligence (IQ score is 70 or lower) and skills appear to vary across areas, but none is at or above average.*

3 **Moderately abnormal intellectual functioning.** The child's overall intelligence is in the range from intellectually disabled to average (IQ score less than 115), and there is significant variability in skills. At least one skill is in average range.

3.5 *The child's overall intelligence is in the range from intellectual disability to average (IQ score less than 115), and there is significant variability in skills. At least one skill in above average range. Extreme savant skills are not included here but are rated in category 4.*

4 **Severely abnormal intellectual functioning.** A rating of 4 is given when extreme savant skills are present, regardless of overall level of intelligence.

15. General Impressions

1 **No autism spectrum disorder.** The child shows none of the symptoms characteristic of autism.

1.5

2 **Mild autism spectrum disorder.** The child shows only a few symptoms or only a mild degree of autism.

2.5

3 **Moderate autism spectrum disorder.** The child shows a number of symptoms or a moderate degree of autism.

3.5

4 **Severe autism spectrum disorder.** The child shows many symptoms or an extreme degree of autism.

Appendix C
Demographic Form

Date Completed: _____Child's Name: _____
Name of Person Completing Form:
_____
Relationship to Child:
_____

Child's Date of Birth: _____ Sex: _____ Number of Siblings: ____
Race: 1 Caucasian
2 Black
3 Asian
4 Hispanic
5 Other (Specify) _____

Has your child ever been diagnosed with any of the following? (check all that apply)
_____ Autism
_____ Asperger's Disorder
_____ PDD-NOS
_____ Mental Retardation or Intellectual Disability
_____ Cerebral Palsy
_____ Down's Syndrome
_____ Hearing Impairment
_____ Other; Please describe:
_____
_____
___

Has your child ever had vision impairment beyond what has been corrected? ___ YES
___NO
Please specify:_____

Is your child on a special or restricted diet? ___YES ___ NO

Please describe: _____

_____

Is your child involved in any of the following therapies? (check all that apply)

Applied Behavior Analysis (ABA) _____
Physical Therapy _____
Occupational Therapy _____
Speech Therapy _____
Early Start Denver Model _____

Other Services: _____

_____

_____

Is your child enrolled in a daycare program YES NO

If yes, how many hours a day?_____

If yes, how long has your child been enrolled in daycare? _____

Appendix D
ITSEA

ITSEA

Parent Form

Child's name _____ Date of birth ___ / ___ / ___ (mm dd yy) Age in months _____

Parent/Guardian's name _____ Date completed ___ / ___ / ___ (mm dd yy) Child's Sex ☐ Boy ☐ Girl

Was your child born prematurely? ☐ No ☐ Yes If yes, what was the expected date of birth? ___ / ___ / ___ (mm dd yy)

Was your child's birth weight less than 5 pounds 8 ounces? ☐ No ☐ Yes

In a typical week, how much time does your child spend with other young children (not including brothers and sisters)? _____ hours per week

Do you use any type of childcare for your child? ☐ No ☐ Yes If yes, how many hours do you use childcare in a typical week? _____ hours

Did your child have any problems at birth? ☐ No ☐ Yes If yes, please explain. _____

SECTION A

This section contains statements about 12- to 35-month-old children. Many statements describe normal feelings and behaviors, but some statements describe feelings and behaviors that may be a problem. Please do your best to respond to every statement.

Please circle the ONE response that best describes your child's behavior in the LAST MONTH.	Not True/ Rarely	Somewhat True/ Sometimes	Very True/ Often
1. Shows pleasure when he or she succeeds (for example, claps for self).	0	1	2
2. Gets hurt so often that you can't take your eyes off of him or her.	0	1	2
3. Seems nervous, tense, or fearful.	0	1	2
4. Is restless and can't sit still.	0	1	2
5. Follows rules.	0	1	2
6. Wakes up at night and needs help to fall asleep again.	0	1	2
7. Cries or has tantrums until he or she is exhausted.	0	1	2
8. Is afraid of certain places, animals, or things. *What is he or she afraid of?*	0	1	2
9. Has less fun than other children.	0	1	2
10. Looks for you (or other parent) when upset.	0	1	2
11. Cries or hangs onto you when you try to leave.	0	1	2
12. Worries a lot or is very serious.	0	1	2
13. Looks right at you when you say his or her name.	0	1	2
14. Does not react when hurt.	0	1	2
15. Is affectionate with loved ones.	0	1	2
16. Won't touch some objects because of how they feel.	0	1	2
17. Has trouble falling asleep or staying asleep.	0	1	2

Section A continued on next page.

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A *Section A continued*

Please circle the ONE response that best describes your child's behavior in the LAST MONTH.

	Not True / Rarely	Somewhat True / Sometimes	Very True / Often	
18. Runs away in public places.	0	1	2	
19. Plays well with other children (not including brother or sister). (Circle N if there is no contact with other children.)	0	1	2	N
20. Can pay attention for a long time (other than when watching TV).	0	1	2	
21. Has trouble adjusting to changes.	0	1	2	
22. Tries to help when someone is hurt (for example, gives a toy).	0	1	2	
23. Often gets very upset.	0	1	2	
24. Gags or chokes on food.	0	1	2	
25. Imitates playful sounds when you ask him or her to.	0	1	2	
26. Refuses to eat.	0	1	2	
27. Hits, shoves, kicks, or bites children (not including brother or sister). (Circle N if there is no contact with other children.)	0	1	2	N
28. Is destructive. Breaks or ruins things on purpose.	0	1	2	
29. Points to show you something far away.	0	1	2	
30. Hits, bites, or kicks you (or other parent).	0	1	2	
31. Hugs or feeds dolls or stuffed animals.	0	1	2	
32. Seems very unhappy, sad, depressed, or withdrawn.	0	1	2	
33. Purposely tries to hurt you (or other parent).	0	1	2	
34. When upset, gets very still, freezes, or doesn't move.	0	1	2	

The following statements describe feelings and behaviors that can be problems for young children. Some of the descriptions may be a bit hard to understand, especially if you have not seen the behavior in your child. Please do your best to respond to all statements.

Please circle the ONE response that best describes your child's behavior in the LAST MONTH.

	Not True / Rarely	Somewhat True / Sometimes	Very True / Often
35. Puts things in a special order over and over and gets upset if he or she is interrupted.	0	1	2
36. Repeats the same action or phrase over and over without enjoyment. *Please give an example:*	0	1	2
37. Repeats a particular movement over and over (like rocking or spinning). *Please give an example:*	0	1	2
38. Spaces out. Is totally unaware of what's happening around him or her.	0	1	2
39. Does not make eye contact.	0	1	2
40. Avoids physical contact.	0	1	2
41. Hurts self on purpose (for example, bangs head). *Please describe:*	0	1	2
42. Eats or drinks things that are not edible, like paper or paint. *Please describe:*	0	1	2

SECTION B

This section contains statements about 12- to 35-month-old children. Many statements describe normal feelings and behaviors, but some statements describe feelings and behaviors that may be a problem. Please do your best to respond to every statement.

Please circle the ONE response that best describes your child's behavior in the LAST MONTH.		Not True/ Rarely	Somewhat True/ Sometimes	Very True/ Often	
1. Is bothered by loud noises or bright lights.		0	1	2	
2. Takes a while to feel comfortable in new places (10 minutes or more).		0	1	2	
3. Acts aggressive when frustrated.		0	1	2	
4. Is quiet or less active in new situations.		0	1	2	
5. Gets upset when left with a *new* babysitter.	(Circle N if you never used a babysitter)	0	1	2	N
6. Responds the first time his or her name is called.		0	1	2	
7. Puts toys away after playing.		0	1	2	
8. Gets very wound up or silly when playing.		0	1	2	
9. Acts bossy.		0	1	2	
10. Is constantly moving.		0	1	2	
11. Dislikes some foods because of how they feel.		0	1	2	
12. Is bothered by certain odors (smells).		0	1	2	
13. Gets upset when left with a familiar babysitter or relative.	(Circle N if you have not used a babysitter or relative in the last month)	0	1	2	N
14. Quiets down when you say "Shh."		0	1	2	
15. Refuses to eat foods that require chewing.		0	1	2	
16. Misbehaves to get attention from adults.		0	1	2	
17. Tries to do as you ask.		0	1	2	
18. Plays with toys for 5 minutes or longer.		0	1	2	
19. Hugs people with a squeeze or pat.	(Circle N if he or she is physically unable to do so.)	0	1	2	N
20. Has started doing something he or she had outgrown (like use a pacifier).		0	1	2	
21. Is afraid of certain *animals*. *Please describe:*		0	1	2	
22. Is afraid of certain *things*. *Please describe:*		0	1	2	
23. Is afraid of certain *places*, like stores, elevators, parks, or cars. *Please describe:*		0	1	2	
24. Hangs on to you or wants to be in your lap when with other people.		0	1	2	
25. Rolls a ball back to you (or someone else).	(Circle N if he or she is physically unable to do so.)	0	1	2	N
26. Likes being cuddled, hugged, or kissed by loved ones.		0	1	2	

Section B continued on next page.

B	*Section B continued* Please circle the ONE response that best describes your child's behavior in the LAST MONTH.	Not True / Rarely	Somewhat True / Sometimes	Very True / Often	
27.	Is very loud. Shouts or screams a lot.	0	1	2	
28.	Reaches for you when you are not holding him or her. (Circle N if he or she is physically unable to do so.)	0	1	2	N
29.	Spits out food.	0	1	2	
30.	Is disobedient or defiant (for example, refuses to do as you ask).	0	1	2	
31.	Cries if he or she doesn't get own way.	0	1	2	
32.	Goes from toy to toy faster than other children his or her age.	0	1	2	
33.	Keeps trying to do something even when it's hard.	0	1	2	
34.	Is sneaky. Hides misbehavior.	0	1	2	
35.	Looks at picture books by himself or herself.	0	1	2	
36.	Helps with dressing (for example, puts arm in sleeve).	0	1	2	
37.	Feels sick when nervous or upset.	0	1	2	
38.	Pretends to do grown-up things, like shaving.	0	1	2	
39.	Is bothered by how some things feel on his or her skin (for example, clothing seams, certain fabrics, etc.).	0	1	2	
40.	Is easily startled.	0	1	2	
41.	Is well-behaved.	0	1	2	
42.	Prefers you (or other parent) over other adults.	0	1	2	
43.	Laughs easily or a lot.	0	1	2	
44.	Is stubborn.	0	1	2	
45.	Is hard to soothe when upset.	0	1	2	
46.	Sleeps through the night.	0	1	2	
47.	Wants to do things for himself or herself.	0	1	2	
48.	Points to ask for something.	0	1	2	
49.	Is bothered by being in motion (for example, swinging, spinning, being tossed in the air, or bouncing).	0	1	2	
50.	Wakes up grouchy or in a bad mood.	0	1	2	
51.	Tries to make you feel better when you're upset.	0	1	2	
52.	Stays still while being changed, dressed, or bathed.	0	1	2	
53.	Has trouble calming down when upset.	0	1	2	
54.	Demands a lot of attention.	0	1	2	
55.	Sits for 5 minutes while you read a story.	0	1	2	
56.	Is worried or upset when someone is hurt.	0	1	2	
57.	Tries to "make-up" for misbehaving.	0	1	2	
58.	Must be held to go to sleep.	0	1	2	
59.	Is impatient or easily frustrated.	0	1	2	
60.	Is interested in other babies and children.	0	1	2	
61.	Likes figuring things out, like stacking blocks.	0	1	2	
62.	Is affectionate with strangers.	0	1	2	

B	*Section B continued* Please circle the ONE response that best describes your child's behavior in the LAST MONTH.	Not True/ Rarely	Somewhat True/ Sometimes	Very True/ Often	
63.	Is aware of other people's feelings.	0	1	2	
64.	Is shy with new adults.	0	1	2	
65.	Is able to wait for things he or she wants.	0	1	2	
66.	Cries a lot.	0	1	2	
67.	Pretends that objects are something else (for example, uses a banana as a phone).	0	1	2	
68.	Accepts new foods right away.	0	1	2	
69.	Enjoys challenging activities.	0	1	2	
70.	Is a perfectionist.	0	1	2	
71.	Imitates clapping or waving bye-bye. (Circle N if he or she is physically unable to do so.)	0	1	2	N
72.	Is not afraid when he or she should be.	0	1	2	
73.	Jokes or gives you things to make you smile or laugh.	0	1	2	
74.	Is irritable or grouchy.	0	1	2	
75.	Pays careful attention when being taught something new.	0	1	2	
76.	Looks unhappy or sad without any reason.	0	1	2	
77.	Sleeps more than other children his or her age.	0	1	2	
78.	Is curious about new things.	0	1	2	
79.	Wakes up screaming and doesn't respond to you for a few minutes *(night terrors)*.	0	1	2	
80.	Is whiny or fussy when he or she is *not* tired.	0	1	2	
81.	Feels bad about himself or herself.	0	1	2	
82.	Is a good eater.	0	1	2	
83.	Is shy with new children.	0	1	2	
84.	Seems to have no energy.	0	1	2	
85.	Gets angry or pouts.	0	1	2	
86.	Wakes up from scary dreams or nightmares.	0	1	2	
87.	Wants to sleep in someone else's room or bed. (Circle N if child always shares a room or bed.)	0	1	2	N
88.	Has temper tantrums.	0	1	2	
89.	Is a picky eater.	0	1	2	
90.	Smiles back at you from across a room.	0	1	2	
91.	Seems withdrawn.	0	1	2	
92.	Seems very unhappy, sad, or depressed.	0	1	2	
93.	Obeys when asked to stop being aggressive.	0	1	2	
94.	Refuses to eat certain foods for 2 days or more.	0	1	2	
95.	Gets upset when asked to change activities.	0	1	2	

SECTION C

Has your child begun to combine words yet; for example, asking for "more juice?" Please check one box and follow the instructions next to that box.

☐ **Not yet** Do not complete this section. Please go to Section D.

☐ **Sometimes** Please respond to Items 1–5 below.

☐ **Often** Please respond to Items 1–5 below.

Please circle the ONE response that best describes your child's behavior in the LAST MONTH.	Not True/ Rarely	Somewhat True/ Sometimes	Very True/ Often
1. Repeats the last words of sentences or TV commercials.	0	1	2
2. Swears.	0	1	2
3. Takes a while to speak in unfamiliar situations.	0	1	2
4. Talks about other people's feelings (for example, "Mommy mad").	0	1	2
5. Talks about strange, scary, or disgusting things. *Please describe:*	0	1	2

SECTION D

In the last month, did your child have any contact (more than 0 hours per week) with other young children **(not including brothers and sisters)**? Please check one box and follow the instructions next to that box.

☐ **No** Do not complete this section. Please go to Section E.

☐ **Yes** Please respond to Items 1–9 below.

Please circle the ONE response that best describes your child's behavior in the LAST MONTH.	Not True/ Rarely	Somewhat True/ Sometimes	Very True/ Often
1. Takes turns when playing with others.	0	1	2
2. Tests other children to see if they will get angry.	0	1	2
3. Asks for things nicely when playing with children.	0	1	2
4. Has at least one favorite friend (a child).	0	1	2
5. Picks on or bullies other children.	0	1	2
6. Teases other children.	0	1	2
7. Plays "house" with other children.	0	1	2
8. Won't let other children play with his or her group.	0	1	2
9. Hurts other children on purpose.	0	1	2

SECTION E

The statements in this section describe feelings and behaviors that can be problems for young children. Some of the descriptions may be a bit hard to understand, especially if you have not seen the behavior in your child. Please do your best to respond to all the statements.

Please circle the ONE response that best describes your child's behavior in the LAST MONTH.	Not True/ Rarely	Somewhat True/ Sometimes	Very True/ Often
1. Has a body tic or twitch he or she seems unable to control (for example, eyes, mouth, nose, or legs twitch).	0	1	2
2. Makes sounds he or she seems unable to control.	0	1	2
3. Holds food in cheeks.	0	1	2
4. Hurts animals on purpose.	0	1	2
5. Is *very* worried about getting dirty.	0	1	2
6. Needs things to be clean or neat.	0	1	2
7. Plays games with other children in which they look at or touch each other's private parts.	0	1	2
8. Plays with own genitals often and for a long time.	0	1	2
9. Pulls own hair out (such as eyelashes, eyebrows, or hair on head).	0	1	2
10. Without looking at you, puts your hand on objects, such as wind-up toys, to make them work.	0	1	2
11. Worries about own body.	0	1	2
12. Plays with own bowel movements ("poops").	0	1	2
13. Has bowel movements where he or she shouldn't (for example, on the floor).	0	1	2
14. Urinates ("pees") where he or she shouldn't.	0	1	2
15. Acts out the same pretend theme over and over without enjoyment. *Please give an example:*	0	1	2
16. Has very strange habits. *Please give an example:*	0	1	2
17. Chews on things he or she shouldn't. *Please give an example:*	0	1	2

SECTION F

The following questions concern your general feelings about your child's behavior.

1. How worried are you about your child's behavior, emotions, or relationships?
   - ☐ Not at all worried
   - ☐ A little worried
   - ☐ Worried
   - ☐ Very worried
2. How worried are you about your child's language development?
   - ☐ Not at all worried
   - ☐ A little worried
   - ☐ Worried
   - ☐ Very worried

ITSEA™

Parent Form
Score Summary

Detach Score Summary before giving form to parent.

Child's name _____ Sex ☐ Boy ☐ Girl Age in months ____

Parent/Guardian's name _____

	Year	Month	Day
Date Completed			
Date of Birth			
Chronological Age			

For Chronological Age, subtract Date of Birth from Date Completed. →

Expected Date of Birth			
Actual Date of Birth			
Adjustment for Prematurity			

To Adjust for Prematurity, subtract Actual Date of Birth from Expected Date of Birth. →

Chronological Age			
Adjustment for Prematurity			
Adjusted Age			

For Adjusted Age, subtract Adjustment for Prematurity from Chronological Age. →

Scoring Directions

Record the mean raw score, then look up the cut scores in Table 2.2 in the Examiner's Manual.

For Problem Subscales: If the mean raw score is equal to or greater than the cut score, check the box in the *Of Concern* column. Look up percentile ranges in Tables A.1.a–d (girls) and B.1.a–d (boys).

For Competence Subscales: If the mean raw score is equal to or less than the cut score, check the box in the *Of Concern* column.

Domain/Subscale	Mean Raw Score	Cut Score	Of Concern	Percentile Range	Comments
Externalizing	◯				
Activity/Impulsivity			☐		
Aggression/Defiance			☐		
Peer Aggression			☐		
Internalizing	◯				
Depression/Withdrawal			☐		
General Anxiety			☐		
Separation Distress			☐		
Inhibition to Novelty			☐		
Dysregulation	◯				
Negative Emotionality			☐		
Sleep			☐		
Eating			☐		
Sensory Sensitivity			☐		
Competence	◯		*Of Concern*		
Compliance			☐		
Attention			☐		
Mastery Motivation			☐		
Imitation/Play			☐		
Empathy			☐		
Prosocial Peer Relations			☐		
Maladaptive Item Cluster		>	☐		
Social Relatedness Item Cluster		<	☐		
Atypical Item Cluster		>	☐		

Continued on next page.

Appendix E
BRIEF-P

BRIEF®-P

Behavior Rating Inventory of Executive Function®–Preschool Version

RATING FORM

Gerard A. Gioia, PhD, Kimberly Andrews Espy, PhD, and Peter K. Isquith, PhD

Instructions to Parents and Teachers

On the following pages is a list of statements that describe young children. We would like to know if the child has had *problems* with these behaviors *during the past 6 months*. Please answer *all the items* the best that you can. Please do not skip any items. Think about the child as you read these statements and circle:

N	if the behavior is	**Never** a problem
S	if the behavior is	**Sometimes** a problem
O	if the behavior is	**Often** a problem

For example, if having tantrums when told "No" is **never** a problem, you would circle **N** for this item:

Has tantrums when told "No" (N) S O

If you make a mistake or want to change your answer, ***DO NOT ERASE***. Instead draw an **X** through the answer you want to change and then circle the correct answer:

Has tantrums when told "No" (X) (S) O

Before you begin answering the items, please fill in the child's name, gender, age, and birth date, as well as your name, relationship to the child, and today's date in the spaces provided at the top of the next page. If you are the child's teacher or child care provider, please check the box next to the response that best describes how well you know the child and indicate how long you have known the child in the space provided.

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Child's Name _____ Gender _____ Age _____ Birth Date ____/____/____

Your Name _____ Today's Date ____/____/____

Relationship to Child: ☐ Mother ☐ Father ☐ Teacher* ☐ Other* _____

How well do you know the child? ☐ Not Well ☐ Moderately Well ☐ Very Well *Have known the child for_____ ☐ months ☐ years.

During the past 6 months, how often has each of the following behaviors been a *problem*?

	Never	Sometimes	Often
1. Overreacts to small problems	N	S	O
2. When given two things to do, remembers only the first or last	N	S	O
3. Is unaware of how his/her behavior affects or bothers others	N	S	O
4. When instructed to clean up, puts things away in a disorganized, random way	N	S	O
5. Becomes upset with new situations	N	S	O
6. Has explosive, angry outbursts	N	S	O
7. Has trouble carrying out the actions needed to complete tasks (such as trying one puzzle piece at a time, cleaning up to earn a reward)	N	S	O
8. Does not stop laughing at funny things or events when others stop	N	S	O
9. Needs to be told to begin a task even when willing to do it	N	S	O
10. Has trouble adjusting to new people (such as babysitter, teacher, friend, or day care worker)	N	S	O
11. Becomes upset too easily	N	S	O
12. Has trouble concentrating on games, puzzles, or play activities	N	S	O
13. Has to be more closely supervised than similar playmates	N	S	O
14. When sent to get something, forgets what he/she is supposed to get	N	S	O
15. Is upset by a change in plans or routine (for example, order of daily activities, adding last minute errands to schedule, change in driving route to store)	N	S	O
16. Has outbursts for little reason	N	S	O
17. Repeats the same mistakes over and over even after help is given	N	S	O
18. Acts wilder or sillier than others in groups (such as birthday parties, play group)	N	S	O
19. Cannot find clothes, shoes, toys, or books even when he/she has been given specific instructions	N	S	O
20. Takes a long time to feel comfortable in new places or situations (such as visiting distant relatives or new friends)	N	S	O
21. Mood changes frequently	N	S	O
22. Makes silly mistakes on things he/she can do	N	S	O
23. Is fidgety, restless, or squirmy	N	S	O
24. Has trouble following established routines for sleeping, eating, or play activities	N	S	O
25. Is bothered by loud noises, bright lights, or certain smells	N	S	O
26. Small events trigger big reactions	N	S	O
27. Has trouble with activities or tasks that have more than one step	N	S	O
28. Is impulsive	N	S	O
29. Has trouble thinking of a different way to solve a problem or complete an activity when stuck	N	S	O
30. Is disturbed by changes in the environment (such as new furniture, things in room moved around, or new clothes)	N	S	O

During the past 6 months, how often has each of the following behaviors been a *problem?*

	Never	Sometimes	Often
31. Angry or tearful outbursts are intense but end suddenly	N	S	O
32. Needs help from adult to stay on task	N	S	O
33. Does not notice when his/her behavior causes negative reactions	N	S	O
34. Leaves messes that others have to clean up even after instruction	N	S	O
35. Has trouble changing activities	N	S	O
36. Reacts more strongly to situations than other children	N	S	O
37. Forgets what he/she is doing in the middle of an activity	N	S	O
38. Does not realize that certain actions bother others	N	S	O
39. Gets caught up in the small details of a task or situation and misses the main idea	N	S	O
40. Has trouble "joining in" at unfamiliar social events (such as birthday parties, picnics, holiday gatherings)	N	S	O
41. Is easily overwhelmed or overstimulated by typical daily activities	N	S	O

42. Has trouble finishing tasks (such as games, puzzles, pretend play activities)	N	S	O
43. Gets out of control more than playmates	N	S	O
44. Cannot find things in room or play area even when given specific instructions	N	S	O
45. Resists change of routine, foods, places, etc.	N	S	O
46. After having a problem, will stay disappointed for a long time	N	S	O
47. Cannot stay on the same topic when talking	N	S	O
48. Talks or plays too loudly	N	S	O
49. Does not complete tasks even after given directions	N	S	O
50. Acts overwhelmed or overstimulated in crowded, busy situations (such as lots of noise, activity, or people)	N	S	O
51. Has trouble getting started on activities or tasks even after instructed	N	S	O
52. Acts too wild or out of control	N	S	O

53. Does not try as hard as his/her ability on activities	N	S	O
54. Has trouble putting the brakes on his/her actions even after being asked	N	S	O
55. Unable to finish describing an event, person, or story	N	S	O
56. Completes tasks or activities too quickly	N	S	O
57. Is unaware when he/she does well and not well	N	S	O
58. Gets easily sidetracked during activities	N	S	O
59. Has trouble remembering something, even after a brief period of time	N	S	O
60. Becomes too silly	N	S	O
61. Has a short attention span	N	S	O
62. Plays carelessly or recklessly in situations where he/she could be hurt (such as playground, swimming pool)	N	S	O
63. Is unaware when he/she performs a task right or wrong	N	S	O

Child's Name _____ Gender _____ Age _____ Birth Date ____/____/____

Your Name _____ Today's Date ____/____/____

Relationship to Child: ☐ Mother ☐ Father ☐ Teacher* ☐ Other* _____

How well do you know the child? ☐ Not Well ☐ Moderately Well ☐ Very Well *Have known the child for_____ ☐ months ☐ years.

During the past 6 months, how often has each of the following behaviors been a *problem*?

	Never	Sometimes	Often
1. Overreacts to small problems	N	S	O
2. When given two things to do, remembers only the first or last	N	S	O
3. Is unaware of how his/her behavior affects or bothers others	N	S	O
4. When instructed to clean up, puts things away in a disorganized, random way	N	S	O
5. Becomes upset with new situations	N	S	O
6. Has explosive, angry outbursts	N	S	O
7. Has trouble carrying out the actions needed to complete tasks (such as trying one puzzle piece at a time, cleaning up to earn a reward)	N	S	O
8. Does not stop laughing at funny things or events when others stop	N	S	O
9. Needs to be told to begin a task even when willing to do it	N	S	O
10. Has trouble adjusting to new people (such as babysitter, teacher, friend, or day care worker)	N	S	O
11. Becomes upset too easily	N	S	O
12. Has trouble concentrating on games, puzzles, or play activities	N	S	O
13. Has to be more closely supervised than similar playmates	N	S	O
14. When sent to get something, forgets what he/she is supposed to get	N	S	O
15. Is upset by a change in plans or routine (for example, order of daily activities, adding last minute errands to schedule, change in driving route to store)	N	S	O
16. Has outbursts for little reason	N	S	O
17. Repeats the same mistakes over and over even after help is given	N	S	O
18. Acts wilder or sillier than others in groups (such as birthday parties, play group)	N	S	O
19. Cannot find clothes, shoes, toys, or books even when he/she has been given specific instructions	N	S	O
20. Takes a long time to feel comfortable in new places or situations (such as visiting distant relatives or new friends)	N	S	O
21. Mood changes frequently	N	S	O
22. Makes silly mistakes on things he/she can do	N	S	O
23. Is fidgety, restless, or squirmy	N	S	O
24. Has trouble following established routines for sleeping, eating, or play activities	N	S	O
25. Is bothered by loud noises, bright lights, or certain smells	N	S	O
26. Small events trigger big reactions	N	S	O
27. Has trouble with activities or tasks that have more than one step	N	S	O
28. Is impulsive	N	S	O
29. Has trouble thinking of a different way to solve a problem or complete an activity when stuck	N	S	O
30. Is disturbed by changes in the environment (such as new furniture, things in room moved around, or new clothes)	N	S	O

During the past 6 months, how often has each of the following behaviors been a *problem?*

	Never	Sometimes	Often
31. Angry or tearful outbursts are intense but end suddenly	N	S	O
32. Needs help from adult to stay on task	N	S	O
33. Does not notice when his/her behavior causes negative reactions	N	S	O
34. Leaves messes that others have to clean up even after instruction	N	S	O
35. Has trouble changing activities	N	S	O
36. Reacts more strongly to situations than other children	N	S	O
37. Forgets what he/she is doing in the middle of an activity	N	S	O
38. Does not realize that certain actions bother others	N	S	O
39. Gets caught up in the small details of a task or situation and misses the main idea	N	S	O
40. Has trouble "joining in" at unfamiliar social events (such as birthday parties, picnics, holiday gatherings)	N	S	O
41. Is easily overwhelmed or overstimulated by typical daily activities	N	S	O

42. Has trouble finishing tasks (such as games, puzzles, pretend play activities)	N	S	O
43. Gets out of control more than playmates	N	S	O
44. Cannot find things in room or play area even when given specific instructions	N	S	O
45. Resists change of routine, foods, places, etc.	N	S	O
46. After having a problem, will stay disappointed for a long time	N	S	O
47. Cannot stay on the same topic when talking	N	S	O
48. Talks or plays too loudly	N	S	O
49. Does not complete tasks even after given directions	N	S	O
50. Acts overwhelmed or overstimulated in crowded, busy situations (such as lots of noise, activity, or people)	N	S	O
51. Has trouble getting started on activities or tasks even after instructed	N	S	O
52. Acts too wild or out of control	N	S	O

53. Does not try as hard as his/her ability on activities	N	S	O
54. Has trouble putting the brakes on his/her actions even after being asked	N	S	O
55. Unable to finish describing an event, person, or story	N	S	O
56. Completes tasks or activities too quickly	N	S	O
57. Is unaware when he/she does well and not well	N	S	O
58. Gets easily sidetracked during activities	N	S	O
59. Has trouble remembering something, even after a brief period of time	N	S	O
60. Becomes too silly	N	S	O
61. Has a short attention span	N	S	O
62. Plays carelessly or recklessly in situations where he/she could be hurt (such as playground, swimming pool)	N	S	O
63. Is unaware when he/she performs a task right or wrong	N	S	O

Appendix F
Play Sample Protocol

1. Parent & child enter the room
2. Introduce a warm-up toy that will be removed or traded with the introduction of the first toy box.
3. Consents
    a. Assess how easily the child will separate from the parent by asking the parent, "How do you think your child will react if you leave the room or are not in the room?" If the parent thinks the child will be uncomfortable, discuss how to approach the play with the Stranger by explaining, "One of our play samples involves play with a person your child hasn't met before. Ideally, we would like for it to be only your child and that person in the room, with you watching behind the mirror [**if available].** Do you think it would be best to explain to your child that you're watching behind the mirror or for you to quietly slip out when he/she is distracted with a toy?" This creates a plan for the transition to Play with a Stranger
    b. If the child begins to tantrum when the parent leaves the room and is not quickly soothed within 1-2 minutes, have the parent remain in the room for the Play Sample with a Stranger with the following instructions, "Try to be filling out this paperwork (ITSEA/BRIEF) while your child is playing with [**assistant's name].** The focus of this section of the study is on how your child plays with a stranger."
4. Parent First
    a. Toy box #1 brought into the room. I remove the lid and spread the toys out onto the floor and say, "We want to get an idea of how you and [**child's name]** usually play. I'll leave the room for about fifteen minutes. Feel free to play with the toys however you typically would. While we want to see the two of you playing together we're also interested in seeing how he/she reacts to you trying to change what he's playing with, such as through cleanup or showing him/her a new toy or game. Most importantly, have fun and play! Do you have any questions?"
    b. Demographic form given either at beginning or middle of play sample with the following script: "As he/she is looking around at the toys, I'd like for you to fill out this brief demographic form. As soon as you're finished, go ahead and start playing with [**child's name]**!" **OR** "I'll be back in a few minutes with a short demographic form. At that time, I'd like for you to take a short break from playing to fill that out. This will allow us to see [**child's name]** playing by himself/herself."

c. After ~12 minutes, I come back to the room with Toy box #2 saying, "Now we have a new set of toys. Try to have [**child's name]** clean up the old set of toys and begin playing with the new set."
d. Once the child has either successfully transitioned to the new set or is calmly ignoring the parent or new set of toys, the play sample with the parent is over. The main point here is to not introduce the play with the Stranger in a time of distress for the child.
e. The Stranger walks in (with myself) and I introduce the play with the Stranger saying, "Next, we want to get an idea of how your child might play with someone he/she hasn't met before. This is [**assistant's name**]. She'll be playing with [**child's name]** with the toys in the same way that you were playing. This time, you and I will leave the room together for about fifteen minutes and they'll play with a variety of toys. You can watch from behind the mirror [**if available**]. Do you have any questions?"
f. Parent leaves the room following the discussed plan in step 2a.
g. Play Sample starts, with coder following trained instructions.
h. Toy Box #3 introduced at ~12 minutes with the same instructions, "Now we have a new set of toys. Try to have [**child's name]** clean up the old set of toys and begin playing with the new set."
i. Second play sample ends at 15 minutes.
j. I ask if they need a break and we proceed to the Mullen/ADOS. Parent remains behind the mirror.
k. Mullen/ITSEA/BRIEF
l. ADOS

5. Stranger First
    a. Toy box #1 brought into the room. I remove the lid and spread the toys out onto the floor and say, "First, we want to get an idea of how your child might play with someone he/she hasn't met before. This is [**assistant's name**]. She'll be playing with [**child's name]** with these toys for about 15 minutes. You and I will leave the room together for about fifteen minutes and they'll play with a variety of toys. After they're finished, you will come in and play with your child with a new set of toys for about 15 minutes; this way we also see how she/he plays with you. You can watch from behind the mirror [**if available**]. Do you have any questions?"
    b. Parent leaves the room following the discussed plan in step 2a.
    c. Play Sample starts, with coder following trained instructions for taking a couple minutes out, either at the beginning or middle of the sample, to pretend to fill out a demographic form, similar to the parent.

d. Toy Box #2 introduced at ~12 minutes with the instructions, "Now we have a new set of toys. Try to have [**child's name]** clean up the old set of toys and begin playing with the new set."
e. Once the child has either successfully transitioned to the new set or is calmly ignoring the parent or new set of toys, the play sample with the Stranger is over and I return to the therapy room with the parent. The main point here is to not introduce the play with the parent in a time of distress for the child.
f. I'll say, "Next we want to get an idea of how you and [**child's name]** usually play. Again, I'll leave the room for about fifteen minutes. Feel free to play with the toys however you typically would. While we want to see the two of you playing together we're also interested in seeing how he/she reacts to you trying to change what he's playing with, such as through cleanup or showing him/her a new toy or game. Most importantly, have fun and play! Do you have any questions?"
g. Demographic form given either at beginning or middle of play sample with the following script: "As he/she is looking around at the toys, I'd like for you to fill out this brief demographic form. As soon as you're finished, go ahead and start playing with your child!" **OR** "I'll be back in a few minutes with a short demographic form. At that time, I'd like for you to take a short break from playing to fill that out. This will allow us to see [**child's name]** playing by himself/herself."
h. After ~12 minutes, I come back to the room with Toy box #3 saying, "Now we have a new set of toys. Try to have [**child's name]** clean up the old set of toys and begin playing with the new set."
i. Second play sample ends at 15 minutes.
j. I ask if they need a break and we proceed to the Mullen/ADOS. Parent remains behind the mirror.
k. Mullen/ITSEA/BRIEF
l. ADOS

Appendix G
Tips for Playing with Kids with ASD

Kids with ASD are sometimes difficult to play with. Unlike other children with typical development, they often will not "give back" in play, such as through smiles, laughter, or back-and-forth play. A child with ASD may appear interested in a ball, leading you to walk over and throw a ball to him. At that instant, the child may wander away as if they want nothing to do with you, despite their interest in the ball. If this style of behavior continues for 5 to 10 minutes, many adults would stop trying to engage the child. Why would you continue to try to play with a child who is sending signals that they are uninterested in you?

Another child may be spinning or engaging in other repetitive behaviors that prevent you from showing them a new toy. Again, many adults unfamiliar with ASD may just let this behavior go and not engage the child as the child appears to be "in his own world". Below are tips for how to increase your chances of successfully engaging a child with ASD, despite repetitive behaviors or lack of interest. The key here is persistence: keep trying different toys and routines until something sticks. Just because they do not respond immediately or after the first or second model is no indication that they won't eventually respond and get "hooked." Remember, every child with ASD is different. No single play tip will work for all kids; just keep trying until you find something that does.

Common "Traps"

1. Capturing the attention of an ASD child can be tough; maintaining that attention is harder.
2. Once you have their attention on an activity, they may repeat the same step over and over and this pattern may be hard to break.
3. Kids with ASD may lack creativity in play; similar to the problem of repetitive routines, they may be presented with a variety of toys and not know what to do with them. Therefore, ALL activities and ideas might need to come from the other play partner. Once these ideas are produced, however, some children play very well.
4. As adults, we are not as easily entertained by simple play. Still, it is VERY important that we play enthusiastically and creatively, for all of the reasons mentioned above. However, this can become tiring and difficult for an adult to be the sole source of play excitement and ideas.

Tips to Avoid Traps

1. Be Visual. Kids with ASD are very visual. There is a huge difference between saying "push the car" and showing them the car.
2. Be in Their Eyesight. This can be tough and may require frequent moving. When trying to show a toy to a child, it may be necessary to "get in their face." This may feel awkward, but necessary. For example, you may be modeling stacking blocks 2 feet away from the child, but it may be necessary to move the blocks directly to his lap or in front of his eyes to ensure that he sees the model. Kids with ASD do not always naturally watch the actions of another person; therefore, they may "miss" the model if you don't bring it to them.
3. Sounds are Different than Spoken Words. Kids with ASD may not respond to "look, car!!" but they may respond to "vroooom vrooooom" or the literal sound of two toy cars crashing. Use this method to get their attention, if needed.
4. Create Routines. Kids with ASD may be interested in the car at first, but may not know what to do with the car, leading to them wandering away quickly. Show them the car and

show them how to push the car into a tower of blocks. Do this two or three more times in rapid succession, making sure that the routine is within his eyesight. This gives the child a chance to notice a simple and predictable routine.

   a. If a child does not appear to have any routines of his own (i.e., pushing a car, stacking blocks, etc.) keep the routines that you introduce simple! In other words, it is likely too early to be introducing a sequence involving pushing the car up the ramp and into the gas station. Simply pushing the car up the ramp is enough.

5. Use an Area of Interest. Kids with ASD tend to have restricted interests. If a child appears solely focused on cars, try to join him in his play with the cars by modeling, imitating, or creating stories with the cars.
6. Avoid unnecessary language. Use the "one-up" rule. If a child is only using single words, it may be best to only communicate with two words. For example, if a child is saying words like "car", "cat", "cup", you can "one-up" this by saying "push car" instead of "Push the car up the ramp and into the garage." Too much language may be overstimulating.
7. Be Excited!! Expressing excitement in play can be tough when your play partner appears uninterested or difficult to engage. However, it is the over-the-top use of smiles and praise that may "hook" a kid and get their attention. Use this. If you feel like you're being too goofy and silly, you're probably doing it right, even if they're not smiling back. Kids with ASD tend to have very "flat" or expression-less affect. Don't let this fool you – they may be enjoying the interaction more than you know.
8. Kids with ASD have trouble generalizing. Just because the child will stack blocks at home, they may not be able to stack nesting cups. Start by modeling the behavior and teaching the child how to generalize certain behaviors, like stacking.
9. Be Physical! If kids don't enjoy toy play, they may react better to more physical or social games, such as peekaboo, tossing in the air, tickling, row-row-your boat, Ring-Around-the-Rosy, etc.
10. Be Creative. Make up your own ways for getting the child's attention. If you're playing with a child and you think of a way that we haven't discussed to get their attention (and it's within ethical reason) do it.
11. When all else fails, keep trying to play. If all of the above techniques fail to engage the kid, try playing on your own, but near the child. Sometimes starting your own simple routine, such as stacking the blocks over and over, is better than nothing. The fact that you're not pursuing the child may make them more likely to approach you and stack blocks beside you or, after a few minutes of you playing by yourself, he may come over and stack one single block.

Appendix H
Data Dictionary

1. **Parallel Play** – the child and parent are involved with play with two separate objects that are identical. Does not involve interaction with one another.
    1. Example: both are pushing separate cars. If cars begin to crash into ONE ANOTHER, this is no longer parallel play, but joint-interactive.
    2. Example: stirring food in individual bowls or plates
2. **Independent Play** – play involving the child alone, meeting the following criteria:
    1. The child chooses the activity
    2. The parent is not PHYSICALLY interacting with the child's activity. Comments may be made but not physically touching the toy set.
3. **Joint-Interactive Play** – play involving both the parent and the child on a child-chosen activity, meeting the following criteria:
    1. The child independently chooses the activity
    2. The parent does nothing to change the overall use of the toyset
    3. The parent MAY build and expand on the child's play, but does not change the purpose of the activity in any way.
        i. Example: Child is playing with a picnic set and is pretending to eat a burger. The parent may alter this play by encouraging the child to pretend to eat a potato chip by placing the chip close to the child's mouth. The chip is a part of the SAME toy set and a part of the SAME activity (pretending to eat food)
4. **Disruptive Play** – play involving both the parent and the child whereby the parent attempts to transition the child to a new activity, meeting the following criteria:
    1. The child does not independently choose the activity
    2. The parent is redirecting the child to an activity or object that the child was not already engaged or interested in
        i. Note: Engagement is defined as touching or looking at a particular toy-set; if child is even looking at that toy-set, then the parent's suggestion of that toy-set would NOT be disruptive
    3. The parent may remain focused on the same toy-set, but changes the use of the toyset.
        i. Example: Child is playing with a picnic set and is pretending to eat a burger. The parent may take the picnic blanket and try to initiate peek-a-boo. While this uses the child's chosen toyset, it is a different activity and not a clear interest of the child. Alternatively, the parent may also initiate a clean-up of the picnic set and suggest playing with something else. This, too, is disruptive play.
    4. Full disruptive play involves 4 parts: child's original activity, disruption by the parent, attempted parental engagement in new activity, child's reaction to the new activity. All four parts must be observed for a moment to be considered a codable moment of "disruptive play".
        i. Coding of disruptive play starts immediately prior to the parent's suggestion of a transition
5. **Arousal** – a change in behavior rate; change may be an increased rate of activity or an decreased rate of activity
6. **Affect** – observable emotional state (e.g., smiling for happy, crying for sad)

1. Remaining the Same
    i. Independent Play: After the person comes near, does the child's affect change since the coding began?
    ii. Joint-Interactive Play: After the person joins in play, does the child's affect change since the previous activity?
    iii. Disruptive Play: After the person tries to change the child's play, does the child's affect change since the previous activity?

7. **Cognitive Change** – Switching to a new activity
8. **Engagement** – response and interaction with the play partner via either gaze, vocalization, or action
9. **New Activity** – This may be a new activity that is either the same or different from the play-partner; the key factor here is that it is a new activity for the child based on what they were doing. In the case of joint interactive play, a new activity would be, by default, different from what the play partner is playing with because they were playing jointly.
10. **Orienting** – front of face is directed toward something else; eye contact not necessary
11. **Toy Set** – all objects and parts of a toy. 2 cars are considered 1 toy set. All pieces of food and dishes, including the basket and lid, are considered part of the toy set. All nesting cups are considered 1 toy set, even if they are on opposite sides of the room.
12. **Repetitive & Stereotyped Behaviors**
    See detailed definitions in below table (Watt, Wetherby, Barber, & Morgan, 2008)
    1. Behavior occurring at least 3 consecutive times or with 3 or more objects and NOT used communicatively
    2. Note the function of the object: rolling back and forth of a car is its function and, therefore, not repetitive. If the child is *peering* at the wheels as they roll, then this becomes repetitive.
    3. Exceptions
        i. Clutching an actual sippy cup, juice box, snack, or doll. If the child has two of these, one in each hand, then this rule is negated and clutching should be coded. However, note that it is VERY typical for children to tote their sippy cup around, so the mere carrying of it is NOT considered repetitive. Carrying two sippies around, however, IS repetitive
    4. Severity
        i. Severe – pervasive and prevents some interactions
        ii. Moderate; will abandon with coaxing or does not interfere with interactions
        iii. Mild - Barley seen, but present

Behavior	Definition
RSB with Objects	
Bangs/Taps	Makes contact between one object with another object or between an object and a surface
Rocks/Flips	Tilts the vertical axis of an object in a back and forth motion of at least 30 degrees or rotates the vertical axis 180 or 360 degrees at least 3 consecutive times
Swipes	Strikes an object or group of objects in a back and forth motion in an effort to move the object 3 consecutive time with no interceding action.
Rubs/Squeezes	Manipulates an object by rubbing or squeezing it or part of the object 3

	consecutive times or moves the object back and forth on the table in a rubbing or pushing motion at least 2 consecutive times.
Lines Up/Stacks	Moves at least 3 objects consecutively into a line or stack with no other actions interceding.
Collects	Holds or gathers 3 or more objects at one time for at least 3 seconds, in one or both hands, under the arm, in a pile, or collecting them in a container such as a bowl, jar, or cup.
Spins/Wobbles	Rotates or turns an object around a vertical axis.
Rolls	Knocks an object over or sets it down and rotates it around a horizontal axis so that it rolls.
Moves/Places	Moves or deliberately places an object to the same side or unique location on the table, floor, or in the top in the same way repeatedly three or more times across the entire sample.
Clutches	Holds onto an object from the previous activity and does not release the object easily with either offer of a new object or attempt by an adult to remove the object.
Fixates Gaze (Sensory)	Fixates gaze on or visually examines an object held to the side or held very close to the eyes.
Feels/Touches (Sensory)	Places any part of the skin other than the hand against an object to feel (e.g., picks up an object and rubs it against the cheek).
Sniffs/Smells (Sensory)	Lifts an object to the nose to sniff it or bends the head to a surface to sniff it.
Licks (Sensory)	Moves the tongue toward an object or surface (including the body) with visible contact.
RSB with Body	
Bangs Surface	Bangs or taps hand/arm against a surface, such as the table or body, while not holding an object.
Pats Body	Pats, taps, or smacks with a clear up-and-down movement releasing and contacting the body with one or more fingers of one or both hands in a flicking motion away from the body.
Rocks/Swivels	Moves the trunk back and forth or swivels the body from left to right or vice versa in the seat in the same way 3 consecutive times
Flaps	Moves the hand, wrist, or arm up-and-down at least 3 consecutive times while not holding any object; may be oriented horizontally or vertically.
Rubs Body	Rubs hands on any part of the body back and forth three times or 3 rubs in one direction in which the hand or finger(s) is lifted between rubs.
Stiffens	Postures or stiffens the fingers, hand, or arm usually with the fingers spread or clenched.
Covers Ears (Sensory)	Holds both hands over the ears in response to an environmental sound or potential for sound such as when watching the balloon being inflated.
Sucks Fingers (Sensory)	Puts one or more fingers or thumb in the mouth for any period of 5 seconds or longer.

SAP-OBSERVATION FORM: Social Partner Stage (page 5)
Emotional Regulation

Child's name: _____

Qtr 1	Qtr 2	Qtr 3	Qtr 4	SELF-REGULATION
				1. Demonstrates availability for learning and interacting
				SR1.1 Notices people and things in the environment
				SR1.2 Shows interest in a variety of sensory and social experiences
				SR1.3 Seeks and tolerates a variety of sensory experiences
				SR1.4 Initiates bids for interaction (= JA1.2)
				SR1.5 Engages in brief reciprocal interaction (= JA1.3)
				SR1.6 Engages in extended reciprocal interaction (= JA1.4)
				SR1.7 Responds to sensory and social experiences with differentiated emotions
				2. Uses behavioral strategies to regulate arousal level during familiar activities
				SR2.1 Uses behavioral strategies to regulate arousal level during solitary activities (↔ SU3.1)
				SR2.2 Uses behavioral strategies to regulate arousal level during social interactions
				SR2.3 Uses behavioral strategies modeled by partners to regulate arousal level
				SR2.4 Uses behavioral strategies to engage productively in an extended activity
				3. Regulates emotion in new and changing situations
				SR3.1 Anticipates another person's actions in familiar routines (= SU2.1)
				SR3.2 Participates in new and changing situations
				SR3.3 Uses behavioral strategies to regulate arousal level in new and changing situations
				SR3.4 Uses behavioral strategies to regulate arousal level during transitions
				4. Recovers from extreme dysregulation by self
				SR4.1 Removes self from overstimulating or undesired activity
				SR4.2 Uses behavioral strategies to recover from extreme dysregulation
				SR4.3 Reengages in interaction or activity after recovery from extreme dysregulation
				SR4.4 Decreases amount of time to recover from extreme dysregulation
				SR4.5 Decreases intensity of dysregulated state

SCORING KEY: 2, criterion met consistently (across two partners in two contexts);
1, criterion met inconsistently or with assistance; **0,** criterion not met

Appendix J
IRB Approval Letter

Office for Research

Institutional Review Board for the
Protection of Human Subjects

April 1, 2013

THE UNIVERSITY OF
ALABAMA
RESEARCH

Megan Crisler
Department of Psychology
College of Arts & Sciences
Box 870348

Re: IRB Application # 12-005-R1
Application Title: Emotion Regulation Assessment for Children with Symptoms of Autism Spectrum Disorders

Dear Ms. Crisler:

The University of Alabama IRB has received the revisions requested by the full board on 3/15/13. The board has reviewed the revisions and your protocol is now approved for a one-year period. Please be advised that your protocol will expire one year from the date of approval, 3/15/13.

If your research will continue beyond this date, complete the IRB Renewal Application by the 15th of the month prior to project expiration. If you need to modify the study, please submit the Modification of An Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure Form.

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB application number. Please use reproductions of the IRB approved stamped consent form to obtain consent from your participants.

Good luck with your research.

Sincerely,

Chair, Non- Medical Institutional Review Board
The University of Alabama

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