ABSTRACT

Title of Thesis: The Relationship Between Temperament and Emotion Understanding in Preschoolers: An Examination of the Influence of Emotionality, Self-Regulation, and Attention

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This study examined the links between temperament and emotion understanding in preschoolers. Temperamental facets of emotionality, attention, and self-regulation were utilized. Emotion understanding is the ability to identify feelings based on facial expressions, behaviors, or situations. Historically, temperamental variables and emotion understanding have been poorly defined, impacting the clarity of research findings. The Structured Temperament Interview (STI) measured facets of temperament and the Emotion Comprehension Test examined emotion understanding. Both measures offer clear definitions of their associated constructs. Additionally, principal components analyses were run on STI dimensions. Correlational analyses were run on the STI and Child Behavior Questionnaire (CBQ), an established measure of temperament, to further determine the STI's utility as a measure of temperament. Results, though mixed, suggest that components of Attention and Emotionality from the STI explain a great deal of the variance in ECT scale scores.

The Relationship between Temperament and Emotion Understanding in Preschoolers: An Examination of the Influence of Emotionality, Self-Regulation, and Attention

by

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Chapter 1: Introduction

Recent research has demonstrated that the development of social competence in young children is inextricably tied to temperamental as well as to emotion understanding characteristics, among other biological and environmental variables. Both temperament and emotion understanding are precursors to the development of social competence, as they are early appearing, and in the case of temperament at least partially biologically based. Although researchers have examined the subsets of both these constructs as they relate to social competence outcomes, little work has been done to examine the links between temperament and emotion understanding with one another. This gap in the research is further complicated in that varying definitions of temperament and emotion understanding are employed by authors, some of which overlap with one another. The following study will clarify the links between temperament and emotion understanding by exploring their relationship and defining and testing specific subsets of each construct.

Social Competence

Social competence is a set of skills that allows children to match their behaviors to situations while attending to broader social mores (Rothbart & Bates, 1998). Competing breadths of conceptualizations exist within this definition, including those which examine only in-vivo competence and others that look at the developmental factors that contribute to one's social competence trajectory. The problem-solving definition of social competence focuses on one's ability to address social dilemmas as they arise with a range of appropriate tools, including accurate assessment of a situation and specific behavioral and emotional reactions (i.e. peace-making, empathy). The developmental

perspective considers the integration of emotion, cognition, and behavior across time as they impact an individual's ability to assess and solve social dilemmas. Regardless of the definition, social competence impacts one's capacity to develop positive peer relationships (Denham & Holt, 1993), mitigates one's use of violent behavior (Denham, Blair, Schmidt, & DeMulder, 2002), and predicts school readiness (Pelco & Victor, 2007), among other outcomes.

Temperament

Given the impact of social competence outcomes across time, it is important to consider the variables that influence its development. Temperament influences social competence, as well as a host of other variables (some of which overlap with the aforementioned variables directly affected by social competence). Modern researchers agree that temperament refers to a pattern of biologically based traits that interact with the environment to inform one's perception of and response to stimuli (Rothbart. 2007; Sanson, Hemphill, & Smart, 2004). General consensus exists that temperamental traits are moderately stable across an individual's lifetime, though their expression may by mitigated by environmental and developmental variables (Goldsmith, Buss, Plomin, Rothbart, Thomas, Chess, Hinde, & McCall, 1997; Sanson, Hemphill, & Smart, 2004).

More disagreement exists around what subdimensions make up temperament. Thomas and Chess (1963) suggested that temperament consists of nine dimensions, including approach-withdrawal, adaptability, quality of mood, intensity of reaction, distractibility, persistence/attention span, rhythmicity, threshold of responsiveness, and activity level. Subsequent research suggests that Thomas and Chess' proposed characteristics overlap and are therefore not unitary constructs (Rowe & Plomin, 1977;

Sanson, Hemphill, & Smart, 2004). Although current conceptualizations still vary, most theorists agree that reactivity, self-regulation, and approach/withdrawal are part of temperament (Goldsmith et all, 1997; Putnam & Rothbart, 2006; Rothbart, 2007; Rowe & Plomin, 1977; Sanson, Hemphill, & Smart, 2004).

Although general agreement exists around the relevance of the aforementioned subdimensions, several camps have developed that support the need to break down these dimensions even further, as well as include other dimensions in the definition of temperament. Rowe and Plomin (1977) compared Thomas and Chess' and Buss and Plomin's conceptualizations of temperament, examining the overlap of temperamental dimensions in an effort to create more well-refined definition. Results from this study showed sociability, emotionality, activity, attention span-persistence, reaction to food, and soothability all to be unitary constructs subsumed under temperament. Rowe and Plomin included these constructs as subscales of the Colorado Childhood Temperament Inventory, one of the earliest measures of temperament.

More contemporary measures of temperament have reconceptualized the construct, keeping some of Rowe & Plomin's subdimensions and introducing others. Mary K. Rothbart's Child Behavior Questionnaire, for example, includes effortful control, negative affectivity, and extraversion/surgency as factors of temperament (Putnam & Rothbart, 2006; Rothbart, 2007).Rothbart's measure stands out in particular because in addition to defining these factors Rothbart defines domains within factors. For instance, within the effortful control factor Rothbart includes attention control, inhibitory control, perceptual sensitivity, and low-intensity pleasure. It should be noted that some of these subdomains overlap with broader conceptualizations of the self-regulation

dimension of temperament, while others were at the time completely new to the definition.

Although the definition of temperament continues to be refined, researchers have examined the relationship between the more agreed upon facets of temperament and other variables, as well as some of the more recently introduced subdimensions. As reported by Sanson et al. (2004), temperament is associated with internalizing and externalizing problems, behavioral and emotional concerns, peer and parental relationships, and school readiness among other outcomes. With regard to social competence, the temperamental dimensions of attention, self-regulation, sociability, and reactivity have all been associated with the positive development of social skills. Inhibition has been associated with peer withdrawal and sociability is commonly associated with popularity. Temperamental reactivity has been associated with the development of internalizing behavior problems.

In a reaction to these competing and often overlapping definitions of temperament, Hedwig Teglasi created the Structured Temperament Interview (STI), a parent report measure which examines qualitative and quantitative temperament data. Teglasi's conceptualization of temperament is unique, as it parcels out temperament into seven dimensions, including, activity, attention/distractibility, emotion, reactivity threshold, approach-avoidance/sociability, and adaptability/self-regulation. Teglasi asserts that while many of these areas have been grouped together in previous work, they in fact constitute separate constructs and should be treated as such.

Emotion Understanding and Emotion Competence

In examining social competence researchers have focused as much on emotion competence and understanding as they have on temperamental variables. Emotion competence is defined as "sustained abilities to understand others' emotions, to react to others' emotions, and to regulate [one's] one emotional expressiveness." (Denham, Blair, Schmidt, & DeMulder, 2002). Several of the tenets of emotion competence overlap with the aforementioned dimensions of temperament. In this particular conceptualization, reactivity and regulation both overlap with commonly cited temperamental dimensions of the same names. The one subset of emotion competence that appears to be a distinct construct is one's ability to understand another's emotions, referred to from here on as emotion understanding. Multiple studies have operationalized this ability as the capacity to correctly identify another individual's emotions based on their facial expression, behaviors, or situational context, though facial expressions have been used most commonly (Denham, Blair, DeMulder, Levitas, Sawyer, Auerback-Major, Queenan, 2003; Denham, Blair, Schmidt, & DeMulder, 2002; Denham, Caverly, Schmidt, Blair, DeMulder, Caal, Hamada, Mason, 2002; Denham & Couchoud, 1990; Glanville & Nowicki, 2002; Izard, Fine, Schultz, Mostow, Ackerman, Youngstrom, 2001; Shultz, Izard, & Bear, 2004).

.Emotion understanding, as a subset of emotion competence or as a stand alone variable, has often been related to social competence outcomes. Research in this area most often utilizes preschool aged participants, as emotion understanding develops during this time period. Elementary school aged children are occasionally studied in this context, though less often. Studies have shown emotion understanding to be related to

aggression (Denham, Blair, Schmidt, & DeMulder, 2002; Denham, Caverly, Schmidt, Blair, DeMulder, Caal, Hamada, & Mason, 2002; Schultz, Izard, Bear, 2004), academic competence (Izard, Fine, Schultz, Mostow, Ackerman, & Youngstrom, 2001), and popularity (Denham, Blair, DeMulder, Levitas, Sawyer, Auerback-Major, & Queenan, 2003).

Denham et al. (2003) examined the links between emotion competence and social competence. As noted earlier, Denham and her colleagues defined emotion competence as the ability to identify emotions, regulate one's own emotions, and express emotions, though it may be argued that regulation and expression overlap with temperamental dimensions. The authors suggested that these variables interact simultaneously with environmental issues to influence social competence outcomes. Emotion competence was assessed during a series of naturalistic observations (to determine emotion expression) and direct assessment using puppets (to determine emotion understanding). Maternal reports were used to assess emotion regulation. Social competence was assessed via teacher ratings. With regard to emotion expressiveness, the authors found that children who exhibited predominantly happy states (as measured by naturalistic observations) tended to have higher social competence ratings than their sad or angry peers. Additionally, children who exhibited better patterns of self-regulation (ability to inhibit negative emotions) as assessed by parent and teacher ratings were also rated as being more socially competent. In their consideration of emotion understanding the authors found that younger preschoolers showed more variability than older preschoolers and subsequently that emotion understanding was more predictive of social competence for young children than for older children. These findings imply that measures of emotion

understanding may lose value beyond a certain age, after children have better mastered the construct.

Although Denham et al.'s study encouraged the examination emotion competence and emotion understanding as they relate to social competence, it confounds several variables. Variables are confounded with other constructs by how they were defined as well as how they were assessed. As previously discussed, the author's definition of emotion competence encompasses emotion understanding and recognition as well as subsumes variables that have routinely been associated with temperament. Therefore, it is difficult to know whether emotion competence alone is examined here, versus some facets of emotion competence mixed with other facets of temperament (which may in some cases be dually conceptualized as emotion competence and temperamental variables). Though it seems that Denham measured emotion identification and emotion competence separately (by conducting naturalistic observations as well as utilizing identification measures), these data were aggregated when considering the relationships between the larger variables. Given that the two are generally considered to be distinct constructs, the paths through which they impact social competence may differ, suggesting that they should not be studied as part of the same variable.

The authors also conceptualized and assessed emotion understanding in a way that is inconsistent with recent literature. Denham et al. examined emotion understanding as it relates to a child's ability to label emotions based on situations alone. Frequently cited literature and measures of emotion understanding suggests that emotion understanding must be defined as a child's ability to identify emotions based on facial expressions, behaviors, and situations, the three of which are typically assessed separately

(Shultz, Izard, & Bear, 2004). In assessing situations alone Denham et al. seem to have neglected critical pieces of emotion understanding. It is therefore uncertain whether the links they suggest exist between emotion understanding and social competence truly characterize the relationship that may exist.

Glanville and Nowicki (2002) examined the impact of African-American children's assessments of facial expressions as they relate to social competence outcomes. The authors hypothesized that African American children in the second, third, and fourth grades would perform equally well with stimuli involving European American and African American faces, whereas European American children would perform better with European American faces. They also predicted that emotion understanding would be related to social competence outcomes. Although these hypotheses were confirmed and undoubtedly added to the relatively small amount of literature on ethnic differences in this area, of particular interest here is the authors use of a facial recognition task as a measure of emotion understanding as it relates to social competence. Children were asked to match a series of situations to a picture of a face that depicted a happy, sad, angry, or fearful expression. In another subtest children were asked to name the emotion depicted in a picture and the intensity of the emotion on a scale from one to five.

Glanville and Nowicki's assessment of emotion understanding, though it does not capture all of the subsets of emotion understanding as noted by Shultz, offers a truer picture of the construct than Denham et al.'s assessment. Glanville and Nowicki addressed both the identification of emotions based on situational variables and the identification of emotions based on facial expressions alone. However, Glanville and Nowicki did not assess children's ability to identify emotions based on another's

behaviors, without the added benefit of facial expressions or situational clues (i.e. pictures or context clues). As such, the true impact of emotion understanding as it relates to social competence was not measured.

Finally, although both temperament and emotion understanding are established precursors of social competence, almost no literature can be found that examines the links between them. Given that the two variables have such significance in social competence outcomes, the relationships between them must be assessed to inform the links between the constructs as well as the definitions of those constructs.

The proposed study utilizes two newly developed instruments to assess the impact of three specifically defined temperamental dimensions on the subsets of emotion understanding. The instruments are comprehensive in their definitions of temperament and emotion understanding respectively, and define the constructs in a way that mitigates concerns about subset overlap and thus their unique influences. Analysis of the impact of emotionality, self-regulation, and attention on emotion understanding on facial recognition, situation-based identification, and behavior-based identification will be conducted. Emotionality, self-regulation and attention, have historically been viewed as temperamental characteristics, and are emerging in recent literature as having unique impacts on socially oriented variables, including social competence and emotion understanding. Therefore, the examination of the impact of temperamental variables on emotion understanding will start with the aforementioned dimensions.

Chapter 2: Specific Temperamental Variables:

Definitions and Associations with Emotion Understanding

Emotionality

The term "emotionality" encompasses several variables, including predominance of an emotion in one's overall affect (mood), ability to regulate emotional responses (emotional self-regulation or effortful control), and emotional responses themselves as elicited by specific situations (reactivity) (Denham, Mason, Caverly, Schmidt, Hackney, Caswell, & DeMulder, 2001; Liew, Eisenberg, & Reiser, 2004; Sakimura, Dang, Ballard, & Hansen, 2008; Schultz, Izard, & Bear, 2004). Though early studies examined the influence of mood on other outcomes, these variables are most often examined in conjunction with one another. Research to date suggests that less than optimal patterns of emotionality (i.e. negative mood, poor self-regulation, and negative reactivity) yield poor social competence outcomes in children (Denham et al, 2004; Liew, Eisenburg, & Reiser, 2004; Sakimura et al, 2004). On a more molecular level, research suggests that adverse patterns of emotionality, in conjunction with other constructs, yield difficulties in emotion understanding (Shultz, Izard, & Bear, 2004).

Though mood, emotional self-regulation, and reactivity are often examined together, early research focused on the impact of mood on other variables. Harris & Siebel (1975) examined the impact of emotion laden thoughts on acts of aggression and altruism. Harris & Siebel found that after inducing happy, sad, or angry thoughts in third grade boys and girls, boys in all conditions became more aggressive whereas girls in all conditions became less aggressive. Minimal impact was seen on altruism. Thoughts were

self-induced, as the children were asked to think of happy, sad, or angry thoughts or experiences. Altruism was measured by willingness to share toys with other children, and aggression was measured by aggressive behaviors towards toys (i.e. punching a blow-up Popeye doll). Although the authors largely attributed their findings to differences between genders rather than the impact of emotional thoughts, their research served as a jumping point for many other theorists examining the impact of emotions on actions and attributions.

Harris & Siebel's study is important as it attempted to examine mood as a unique variable without other context, rather than taking into account the interactional effects other variables may have with mood and therefore on outcomes. Modern researchers have coupled mood with other co-occuring variables to examine the broader impact of emotionality on outcomes. As discussed earlier, current definitions of emotionality include predominance of an emotion (mood), the ability to regulate emotional responses (emotional self-regulation or effortful control), and the emotional responses themselves as elicited by specific situations (reactivity). Though studies examine the conjoint impact of the subvariables of emotionality, many still categorize outcomes as they relate to a predominance of positive versus negative mood.

With regard to positive mood, Liew, Eisenberg, and Reiser (2004) examined the relationship between effortful control, low negative emotionality (mood), reaction to disappointment (reactivity), and social competence in preschool children. The researchers found that children who exhibit high levels of effortful control and low levels of negative emotionality showed fewer signs of disappointment when presented with an unwanted gift. Signs of disappointment included verbal and gestural signs as well as affective signs.

In a related manner, children who exhibited this pattern (high effortful control, low negative emotionality, and “polite” reactions) were rated as more socially competent by their teachers than were other children Effortful control and emotionality were measured via parent and teacher rating, Reaction to disappointment and levels of anger and aggression were assessed via direct assessment and peer ratings. Though the researchers did not break down the influence of each variable on ratings of social competence, their work supports the notion that positive emotionality improves one’s facility in the many facets of social competence.

Sakimura et al. (2008) examined the patterns of emotionality most evident in children who exhibit aggressive traits. Per Sakimura et al., three groups are evident in children ages 3-5.11, including 1) low-adaptability/high negative mood/low persistence/ high activity/ low cognitive ability, 2) low-adaptability/high negative mood/low persistence/high activity/ average cognitive ability, and 3) average-adaptability/mood/persistence/activity/cognitive ability. Variables were assessed using parent and teacher ratings on behavioral and temperament rating scales. The first and second groups accounted for the largest percentage of children (41.9% and 38.7% respectively), suggesting that temperamental variables, specifically emotionality and activity levels, rather than cognition, have the greatest impact on aggressive outcomes, though some studies suggest that cognitions mediate temperamental variables.

Denham et al. (2001) examined the links between high levels of anger (mood) and negative emotional responses (reactivity) as they related to social competence evaluations of three and four year old children. Mood was assessed via naturalistic observations of predominance of emotions. Reactivity and social competence were assessed via

observations and researcher ratings of reactions to others during play. Parent ratings on the Child Behavior Questionnaire were also used as measures of reactivity and externalizing behavior. Denham et al. found two groups of children, a “happy/nice” group which exhibited positive mood and positive/appropriate emotional reactivity, and an “unhappy/not nice” group, in which children showed high levels of anger (negative mood) and negative/inappropriate emotional reactivity. Overall, children in the “unhappy/not nice” group were rated as having significantly more difficulties with social competence when evaluated by their peers in a sociometric ratings task (placing other children on a nominal scale according to how much they are “liked” or “not liked”). However, gender differences became apparent in parent and teacher ratings. According to adult ratings of social competence, only boys in the “unhappy/not nice” group were rated as having poorer social competence abilities than their positive mood/reactivity counterparts. Girls in the positive and negative groups showed no differences in social competence evaluations. The authors suggested that stereotypes and bias around gender roles may have influenced parent and teacher ratings of social competence. Regardless, the study indicates that some differences do exist in social competence outcomes between individuals with positive patterns and negative patterns of mood and reactivity.

There is a great deal more research on the relationship between emotionality and social competence as broader constructs than there is on the interrelations between the variables that make up each construct. Specifically, little work examines the relationship between emotionality and emotion understanding, a precursor to social competence. Shultz, Izard, and Bear (2004) examined the relationship between emotionality, social information processing, and emotion understanding. In addition to examining the

differential impact of emotionality and social information processing on emotion understanding, the authors broke down emotion understanding into its three identified sub-variables: facial recognition, identification based on situations, and identification based on behaviors. To assess emotionality, researchers utilized teacher reports and peer ratings. Teachers were asked to indicate the amount of time children spent expressing a particular positive or negative emotion. Peers were asked to nominate other students who expressed particular emotions often. Social information processing and emotion understanding were assessed using the Assessment of Children's Emotion Skills (ACES). In their study of first and second grade children, the authors found that in the case of generally angry and fearful children, a predominant temperamental mood was related to an attribution bias for the same emotion (i.e. fearful children tend to believe others are fearful). Additionally, a predominantly happy mood was related to higher levels of attribution accuracy as well as empathy, whereas a predominantly angry mood was related to lower levels of empathy. As evident in other studies, the researchers found some gender and age differences in accuracy, with both girls and older children better able to identify emotions overall. This study is especially important as it shows the impact that emotionality has on social information processing, and subsequently children's specific emotion understanding abilities.

Schultz, Izard, and Bear's study is also notable in that the three facets of emotion understanding were assessed using ACES, the measure on which the current project's Emotion Comprehension Test is based. ACES, and subsequently the Emotion Comprehension Test, are unique in that each specifically and clearly separates the three facets of emotion understanding into its own subtest. Facial recognition is assessed by

asking children to name the emotion a pictured individual is feeling by choosing from a list of simple feeling words. The photos used depict elementary school children posing specific emotions Situation based emotion understanding is assessed by reading a brief story to the child that describes a situation and asking the child to indicate how the person would feel. Finally, behavior based emotion understanding also utilizes brief stories that describe a child's behavior in response to a situation.

Given the high levels of similarity between the ACES and Emotion Comprehension Test (a measure used in this paper to assess emotion understanding), it stands to reason that the current study will show results similar to those found by Shultz, Izard, and Bear (2004). Specifically, high negatively valenced emotions as assessed by the STI and CBQ are expected to correlate with lower levels of emotion understanding, whereas high levels of positive mood on these measures would predict higher emotion understanding. Emotional self-regulation is expected to have less of an impact on emotional understanding than emotional reactivity. Nevertheless, the relative impact of reactivity and self-regulation as distinct constructs is still an open question and may change with development.

Self-Regulation

Self-regulation implies one's ability to modulate his or her actions and reactions. However, modern researchers contend that this broad definition is not enough. Instead, one must consider more specifically what is being regulated. Cognition, emotion, and behavior have been parsed out in recent research as three separate entities which an individual must regulate (Jahromi & Stifter, 2008). Though some current studies continue to mis-categorize subfacets of these three types of regulation, vast improvements have

been made with regards to parsing out constructs and thus mitigating possible overlap regarding outcomes.

Cognitive self-regulation includes goal-directed behavior, organization of behavior, and flexibility of behavior (Jahromi & Stifter, 2008). Often thought to be closely associated with, or even part of executive functioning, cognitive self-regulation is most often assessed by asking a child to apply novel or atypical rules to a familiar situation (i.e. going against instinct) (Carlson & Wang, 2007; McCabe & Brooks-Gunn, 2007; McClelland et al., 2007). To that end, cognitive self-regulation taps into rote inhibition as well as one's ability to apply a new skill set in lieu of an old one.

Behavioral self-regulation refers to the regulation of motor activity, including approach or non-approach to various situations, speed of approach, and general pace of movement as appropriate to an activity (Jahromi & Stifter, 2008). Behavioral self-regulation also includes inhibition, often as part of the approach/non-approach category. However, important differences exist between inhibition in the cognitive category and inhibition in the behavioral category. In the behavioral category inhibition refers only to stopping a behavior or activity. Cognitive self-regulation of inhibition is more complex, as it refers not only to stopping an action, but replacing it with another (part of planning and this executive functioning). Behavioral inhibition is typically measured with delayed gratification tasks (i.e. waiting 10 minutes before eating candy) (Carlson & Wang, 2007; Eiden, Edwards, & Leonard, 2007; McCabe & Brooks-Gunn, 2007; McClelland et al., 2007).

Emotion self-regulation refers largely to the modulation of expressions of feeling in response to a provoking situation (Jahromi & Stifter, 2008). An oft examined variable,

emotion self-regulation is often measured by deliberately frustrating or disappointing a child (i.e. giving an unwanted gift) and determining whether the child is able to mask his or her negative emotion for a more socially appropriate neutral or positive emotion (Carlson & Wang, 2007; Hill, Degnan, Calkins, & Keane, 2006).

Despite a clear distinction between emotional self-regulation and its cognitive and behavioral counterparts, cognitive and behavioral self-regulation tend to be lumped together as one variable. Studies often classify both inhibition alone and inhibition of familiar rules in favor of novel ones (which requires a component of executive functioning) as behavioral self-regulation. These issues, however, appear to be limited to name/type categorization alone. The variables themselves, though they may be called many different names, are most often examined separately. Therefore, studies are able to make clear distinctions between variables and associated outcomes.

Several studies have examined the impact of age on different types of self-regulation. Jahromi & Stifter (2008) found that cognitive self-regulation, as assessed by various rule-switching tasks (i.e. a modified Stroop task), improves between three and six years of age. Carlson and Wong (2007) found that inhibitory control, as measured by a Simon Says-like task and delayed gratification task, improves between ages four to six. The researchers also found an improvement in emotion regulation during this time-period, as measured by ability to suppress negative emotions when receiving a disappointing gift as well as ability to keep an exciting secret. McCabe and Brooks-Gunn (2007) lumped several types of self-regulation together, studying cognitive control, motor control, delayed gratification, and sustained attention under the gross heading of self-regulation. These researchers claimed that self-regulation improves between the ages of

three and five across the board, though they did not clarify between types of regulation. Regulation in this study was assessed similarly to other studies. Little clear data are available regarding the growth of behavioral regulation during the preschool years. Similarly, few studies have found gender to impact self-regulation (McCabe & Brooks-Gunn, 2007). Even so, differences between genders on self-regulation itself contribute to outcomes on other variables (Hill, Degnan, Calkins, & Keane, 2006).

Self-regulation in its many forms has been linked to several other outcomes. McClelland et al. (2007) studied the impact of behavioral self-regulation on academic outcomes in three to six year old children. Behavioral self-regulation in this study was defined as inhibitory control, attention, working memory, and ability to follow novel instructions in lieu of familiar/instinctual instructions. That said, the study actually examined a combination of behavioral self-regulation, cognitive self-regulation, memory, and attention. McClelland et al. found that behavioral self-regulation, as measured by asking children to perform a series of "opposite" tasks with their bodies, positively predicts literacy, math, and vocabulary skills. Academic skills were measured using the Woodcock-Johnson Test of Achievement. This finding held after controlling for age, gender, and native language.

Jahromi and Stifter (2008) examined the links between all three types of self-regulation and understanding of false belief. False belief, or recognizing that others may not have the same information base as ourselves and thus might come to different conclusions, is often thought to be part of the theory of mind construct. Jahromi and Stifter defined the three types of self-regulation as was initially described in this section. The researchers found that in four and five year old children executive functioning, as

measured by several inhibition and familiar to novel instructions tasks, predicts improved false belief abilities. Emotion regulation was measured by assessing whether children were able to mask frustration and disappointment. Behavioral self-regulation was assessed via a delayed gratification tasks (waiting to take M&M candies) as well as resistance to temptation (not taking forbidden toys in a playroom).

Carlson and Wang (2007) examined the links between inhibitory control and emotion regulation in four to six year old children. Notably, the researchers opted not to list inhibitory control as a subset of any type of self-regulation, instead examining it on its own. Inhibitory control was assessed via Simon Says-like tasks and delayed gratification tasks. This suggests that in addition to examining inhibition (part of behavioral self-regulation), the authors also examined ability to inhibit familiar instructions and use novel ones (part of cognitive self-regulation). Emotion self-regulation was assessed by examining whether children were able to mask disappointment, as well as if they were able to keep an exciting secret. Carlson and Wang found that inhibitory control is positively correlated with emotion regulation, and that moderate levels of inhibitory control are most strongly correlated with high levels of emotion regulation. These correlations were more strongly evident in girls than in boys, suggesting a possible gender difference.

Other studies suggest that facets of self-regulation influence externalizing behavior in young children. Eiden, Edwards, and Leonard (2007) concluded that parental alcoholism when children are two years old influences self-regulation in three year old children. This in turn influences externalizing behavior in kindergarteners. The researchers defined self-regulation as the modulation of behavior and affect, including

effortful control and internalization of rules systems. Self-regulation was measured with delayed gratification tasks, suggesting that the researchers focused largely on inhibition and thus behavioral self-regulation. The authors found that high levels of what was termed “effortful control” (per the delayed gratification tasks) at three years of age was associated with low levels of externalizing behavior at three years of age and in kindergarten, per mother and teacher report. Additionally, high levels of rule internalization, as measured by observation, were associated with low levels of externalizing behaviors per father and teacher report.

Hill, Degnan, Calkins, and Keane (2006) examined the influence of emotion regulation and inattention on externalizing behaviors in two, four, and five year olds. Emotion regulation was assessed by examining whether a child could mask frustration, and inattention was assessed via an ADHD rating scale. Externalizing behaviors were assessed via parent report on a behavior rating scale. The researchers found that in girls, poor emotion regulation and high levels of inattention predicted classification in the chronic/clinical category of the externalizing behavior scale. In boys, socioeconomic status and inattention predicted classification into this group. Thus, these two studies suggest that both behavioral self-regulation and emotion self-regulation have an impact on externalizing behaviors, further demonstrating the importance of self-regulation.

Although the aforementioned studies have delineated the importance of self-regulation with regard to how it influences other outcomes, little has been said about what influences self-regulation itself. As part of their study, Eiden, Edwards, and Leonard (2007) found that low levels of parental warmth and high levels of parental alcoholism are associated with low levels of self-regulation (behavioral) in three year olds and

kindergarteners. In addition to parent related variables, peer-related issues are also associated with patterns of self-regulation in young children. McCabe and Brooks-Gunn (2007) examined self-regulation as assessed by inhibition and motor control tasks (behavioral self-regulation) as well as inhibition of familiar rules in favor of novel rules (cognitive self-regulation). Tasks were performed twice, once in an individual setting and once with a group of peers. The researchers grouped these tasks under one large self-regulation category. The researchers found that children three to five years old perform better on tasks in an individual setting than they do in a peer group setting, suggesting that context and social stimuli are important considerations for level of self-regulation.

Studies examining the links between self-regulation and emotion understanding are tremendously sparse, though the above review notes ties to externalizing behavior (which is linked to social competence). It stands to reason that much of the literature regarding behavioral regulation, or inhibition, may be subsumed under studies of attention rather than self-regulation. Such studies will be reviewed in the next section. Additionally, whereas many studies have examined the impact of emotion understanding on social competence, few have been so specific as to relate any form of self-regulation to emotion understanding. Thus, it is difficult to predict how the three types of self-regulation will be associated with emotion understanding in the present study.

Attention

Arguably one of the most complex and highly-studied variables in modern research, attention and its subsets have been linked to a host of academic and social outcomes. Though the vast majority of studies utilize DSM-IV TR criteria for Attention Deficit Hyperactivity Disorder (ADHD) to define attention related independent variables,

such conceptualizations prove narrow in focus when considering the impact of the broader construct. In actuality, "attention" covers a much larger set of ideas and thus influences a greater number of outcomes than those associated with ADHD diagnoses and deficits, inclusive of social competence and emotion understanding outcomes.

Attention Deficit Hyperactivity Disorder refers to a set of characteristics defined as either "hyperactive" or "inattentive" in nature, each of which is named as a type of the disorder. Children may also be diagnosed "ADHD-combined type," in which both hyperactive and inattentive concerns are highly present. Though conceptualized in part as a deficit in executive functioning, the diagnosis criteria largely focus on a child's behaviors rather than the thought processes which inform them. Subsequently, interventions address the explicit behaviors themselves and outcomes of those behaviors. In recent years, ADHD has gained increased prominence both in clinical practice and research, as the prevalence rate of ADHD in the general United States population now lies between 3.0 and 7.8% (Smith, Barkley, & Shapiro, 2007). However, additional work on attention suggests that attention as a construct is much more complicated than the ADHD diagnosis otherwise implies.

Based on the literature in attention, in her Structured Temperament Interview, Teglasi breaks attention into two broad categories, attention span/persistence and distractibility, each of which is further divided into subcategories. Teglasi asserts that attention span/persistence consists of behavioral (time on task, persistence on difficult tasks), cognitive (selective focus, shifting attention, self-regulation of behaviors including inhibition), and emotional components (interest and absorption levels). In Teglasi's definition distractibility refers to distractibility due to both internal (intrusive thoughts)

and external (environmental) issues. Consistent with other temperament measures, Teglasi separates motor activity level, from which the ADHD conceptualization of hyperactivity arises, into another scale entirely. Teglasi differentiates between activity level as motorically expressed energy and self-regulation to modulate the activity to the situation (Teglasi, et al 2009). These two components of activity are distinct constructs with differential impact on various outcomes.

In addition to the aforementioned areas, researchers often differentiate between visual and auditory attention. It is important to note that rather than referring to and differentiating between attentional processes, in using these terms most researchers seek only to distinguish between modes of presentation of information. Little work exists which examines the relationship between visual and/or auditory attention and social competence outcomes.

The vast majority of articles that examine the relationship between attention and emotion understanding define attention in terms of deficits outlined by an ADHD diagnosis. Even so, most authors fail to differentiate between outcomes for the facets of attention not only within the broader definition, but types within the ADHD diagnosis. Among articles reviewed for the current study, only one attempted to differentiate between ADHD types as they related to emotion understanding outcomes (Lee et al., 2009). Additionally, few articles addressed what type of attention their measures of emotion understanding may have tapped into. This makes it difficult to discern what specific part of attention impacted outcomes most. The need for additional work examining the relationships between individual subsets of attention and emotion

understanding is evident. This review begins with the available work on ADHD and its related emotion understanding outcomes.

Though all studies described herein define attention in terms of deficits associated with ADHD, and compare it with emotion understanding outcomes, the extent to which attention is further defined varies. For example, Lee, Hung, Lam, & Lee (1999) broke down their analyses to determine whether or not the type of ADHD a child has been diagnosed with further qualifies their emotion understanding outcomes. Lee et al., however, are in the minority with regard to their specificity. Although several other studies compared emotion understanding results between populations (i.e. children with ADHD as compared to Autistic children or typically developing children), no other study attempted to further refine their definition of attention and subsequently attend to the types of attention or attention deficits that may impact emotion understanding. Given the diversity of skills addressed within the broader definition of attention, including and beyond those typified by an ADHD diagnosis, the lack of specificity with regard to outcomes is troubling. Additionally, among the articles reviewed no authors specified what type of attention might have been addressed by the emotion understanding task. Though significant results in many studies were found, the direct links between attention and emotion understanding are blurred by the lack of information with regard to what parts of the two constructs were linked in the task at hand.

Definitions and measurement of emotion understanding was also variable across studies. Most commonly, researchers measured emotion understanding by examining a child's ability to correctly identify the feelings associated with a series of facial expressions, called "emotion identification" in this paper (Sinzig, Morsch, & Lehmkuhl,

2008; Yuill & Lyon, 2007). In some cases researchers also integrated situation and behavior based components of emotion understanding (DaFonseca, Seguier, Santos, Poinso, Deruelle, 2009; Lee et al, 1999; Shin, Lee, Kim, Park, Lim, 2008; Singh, Winton, Singh, Leung, Oswald, 1998). However, though many researchers attended to broader definitions of emotion understanding by utilizing all three facets, the three components and their independent links to attention were not distinguished from one another in any analysis. Instead, facial recognition and situation and/or behavior components were often confounded by being collapsed into one gross task (i.e. point to the face that identifies the emotion felt by the story character), making an analysis of the true, independent relationships between emotion understanding and attention subvariables impossible (DaFonseca et al, 2009; Lee et al., 2009; Shin et al., 2008; Singh et al. 1998; Yuill & Lyon, 2007). It is important to note that age ranges were also variable across studies, including children ages five to fifteen across all studies, though most focused on the middle childhood years.

With those limitations in mind, several broad trends became obvious. Across almost all studies, children diagnosed with ADHD performed significantly worse than typically developing children on any type of emotion understanding task (facial recognition, situation based, behavioral based, and combined tasks) (DaFonseca et al., 2009; Sinzig, Morsch, & Lehmkuhl, 2008; Shin et al., 2008; Singh et al., 1998; Yuill & Lyon, 2007). Additionally, children diagnosed with ADHD performed worse than their Autistic peers on facial recognition tasks (Sinzig, Morsch, & Lehmkuhl, 2008). This is especially interesting given the markedly social nature of autism as a disorder versus ADHD, though ADHD is marked by a number of poor social outcomes.

With regard to facility with specific emotions, children with ADHD were often better able to identify positively valenced emotions as opposed to negatively valenced emotions (i.e. happy versus mad). This outcome was similar to that of their typically developing peers. Children in these studies ranged in age from five to fifteen (DaFonseca et al., 2009, Lee et al., 2009, Singh et al., 1998). However, though children with ADHD and typically developing children were both better able to identify positive emotions overall, children with ADHD had more difficulty identifying these emotions than their typically developing counterparts in facial recognition-situation tasks, with children ranging in age from five to fifteen (DaFonseca et al. 2009; Shin et al., 2008; Singh et al., 1998; Yuill & Lyon, 2007). Similarly, children with ADHD also had more difficulty identifying negative emotions in facial recognition-situation tasks than their typically developing peers (DaFonseca et al. 2009; Shin et al., 2008; Singh et al., 1998; Yuill & Lyon, 2007).

Only one study indicated that children with ADHD showed no statistically significant difference in their emotion understanding abilities as compared to typically developing children. Shin et al. (2008) assessed boys between the ages of 6 and 15 with ADHD as well as an age-matched control group. The authors found that children with ADHD had more difficulty than the control group on straight-forward facial recognition tasks. However, when children with ADHD were asked to identify an emotion based on a short story (situation) and cartoon picture (facial expression), they performed as well as their typically developing peers. Such comparisons lend credence to the notion that relationship between attention and emotion understanding is not simplistic, and that the two variables and their relationships must be broken down in a more thorough and

specific manner. Additionally, the manner in which emotion understanding is measured might also be relevant. It stands to reason that children may have differing levels of accuracy when examining pictures of real children versus cartoons, as cartoons are often exaggerated.

Yuill and Lyon (2007) suggested that the particular difficulty children with ADHD have is not due to attention concerns alone. Yuill and Lyon studied typically developing children and children with ADHD between the ages of 5-11 in a mixed facial recognition and situation based task. Children were asked to point to a photograph of a child whose depicted emotion matched their desired response. Additionally, the researchers asked the children to perform a similar task where they were asked to identify a blacked out object based on conceptual cues, rather than a facial expression. The children with ADHD fared worse than typically developing children on both tasks, though the emotion task (task one) was markedly more difficult for them. Yuill and Lyon interpreted this to mean that ADHD children's difficulties are centered around emotions as well as a poor ability to make conceptual links between context cues and missing information. In the same study Yuill and Lyon found that when children were offered strategies for coping with inhibition difficulties they performed better on emotion understanding tasks, though still not as well the control group. Thus, the researchers suggest that the emotion understanding of children with ADHD is most strongly impacted by a poor ability in the area of inhibition as well as high levels of inattention.

DaFonseca et al. (2009) assessed children ages 5-15 diagnosed with ADHD. The researchers found that children with ADHD had more difficulty using contextual cues to recognize and name emotions than they did objects, whereas children in the control group

preformed equally well on both tasks. Additionally, children with ADHD had more difficulty with both tasks overall than did the control group. Emotion understanding was assessed via a photographic facial recognition task, presented as identification alone as well as identification with situational stories. Object naming was assessed by blocking an item in the photograph and asking children to name what was blocked (inclusive of faces and objects). DaFonseca et al. suggested that children with ADHD do not have difficulty with emotion understanding due to attentional difficulties alone, as defined by the diagnostic criteria. If that were the case, they would have exhibited equal difficulties on both the emotion and objects task. Rather, DaFonseca et al. hypothesized that another unnamed construct must be involved that impacts children's emotion understanding.

The notion that another construct must be at play is further supported by work by Lee et al. In their 1999 study Lee et al. compared children ages 6-9 with ADHD to children without ADHD. Notably, Lee et al. found no difference in the scores of the control and experimental groups on combined facial recognition and situation/behavior based tasks. Additionally, Lee et al. found no difference between levels of inattention and impulsivity between the groups. Finally, no within-group differences existed between children with different subtypes of ADHD. Lee et al. did find, however, that intelligence was correlated with accuracy scores on emotion understanding tasks for both groups, suggesting yet another construct which may influence levels of emotion understanding.

Lee et al.'s work is further supported by that of Sinzig, Morsch, & Lehmkuhl (2008). In a straight forward facial recognition task the researchers found significant differences in the emotion understanding scores of children with ADHD as compared to both Autistic and typically developing groups. They also found that intelligence was

positively correlated with overall emotion understanding scores across several tasks. Interestingly, intelligence was not significantly correlated with emotion understanding scores in DaFonseca et al.'s study (2009), described earlier. It should be noted that Lee et al.'s study assessed children from ages six to nine, while DaFonseca et al. and Sinzig, Morsch, & Lehmkuhl's study included teenagers as well as late elementary school children.

In addition to intelligence and inhibition, several researchers found that participant age mitigates emotion understanding outcomes. Sinzig et al. (2008) found a positive correlation between age and emotion understanding scores in children ages six to eighteen. Shin et al. found that age accounts significantly for one's ability to correctly identify negative emotions in a combined facial recognition and situation/behavior based task (effect size 11.6%, $P<0.01$). This finding seems reasonable being that, as described earlier, negatively valenced emotions are typically more difficult to identify than positively valenced emotions. DaFonseca et al. (2009) did not find age to be a significant contributor to emotion understanding scores, again focusing on levels of inhibition as a significant factor. DaFonseca et al.'s study focused on children ages five to fifteen.

Given this body of research, the current study expects to find that children who exhibit high levels of distractibility and low levels of persistence will achieve lower emotion understanding scores across all domains, facial recognition, situation-based recognition, and behavior-based recognition, than peers with opposite patterns. As age and gender were shown to impact emotion understanding scores, they will be controlled for in this study.

Chapter 3: Methods

Hypotheses

The Emotionality, Self-Regulation, and Attention dimensions of the STI and their components were examined in relation to the three factors of the CBQ, including Effortful Control, Extraversion/Surgency, and Negative Affect. Both measures of temperament were then examined as they relate to emotion understanding. More specifically, this study examined the unique and joint contributions of selected temperament dimensions, measured with the Structured Temperament Interview (STI) and Child Behavioral Questionnaire, (CBQ) to emotion understanding, as measured by three scales of the Emotion Comprehension Test (ECT). The CBQ Effortful Control, Extraversion/Surgency, and Negative Affect scales were also considered as a basis for comparison.

Each of the three listed broad dimensions of the STI was thought to be comprised of several components. A listing of specific components within each dimension can be found later in the "Measures" section of this manuscript. Briefly, Emotionality is defined in terms of positively/negatively valenced emotions and reactivity. Self-regulation is defined as cognitive self-regulation, emotional self-regulation, and adaptability to rules/routines. Attention is defined in terms of persistence and distractibility to external and internal stimuli. The CBQ includes 15 scales that cluster into three factors including Effortful Control, Extraversion/Surgency, and Negative Affect. Effortful Control subsumes constructs that are similar to the Attention/Distractibility and Self-Regulation dimensions of the STI. Negative Affect corresponds to the Negative Valence component of the STI Emotionality dimension as well as some aspects of Self-Regulation.

Extraversion/Surgency corresponds to the Positively Valence component of the STI Emotionality dimension. The ECT examines emotion understanding capacities as related to facial recognition, situations (using context clues), and behaviors. Detailed description of the CBQ and ECT may also be found in the "Measures" section.

It was hypothesized that the components of each of the three broad dimensions of the STI emerging from principal components analyses would resemble those proposed by Teglasi (2007) as listed in the "Measures" section. After determining what components make up these dimensions, correlations were run between the components within each broad dimension, as well as between the components among all three broad dimensions. Correlations were also run between the STI components and CBQ factors and scales, and internal consistencies of the STI and CBQ scales were examined. The tables below list the hypothesized directions of correlations. Analogous scales from the STI and CBQ were expected to correlate positively.

Consistent with patterns found in previous studies, the following patterns of intercorrelations were expected within the CBQ (Putnam & Rothbart, 2006):

Table 1

Intercorrelations of the CBQ

	Effortful Control	Extraversion/Surgency	Negative Affect
Effortful Control	NA	-	-
Extraversion/Surgency		NA	-
Negative Affect			NA

The following correlations were expected between STI components, given the nature of constructs involved and the parallel nature of STI components and CBQ scales.

Table 2

Expected Directions of STI Between Dimension Component Correlations

	Emotionality	Self-Regulation	Attention/Distractibility
Emotionality	NA	+(positive emotions), - (negative emotions)	-
Self-Regulation		NA	-
Attention			NA

The following correlations were expected between STI components and CBQ factors.

Table 3

Expected Directions of STI and CBQ Component Correlations:

Emotionality	Effortful Control	Extraversion/Surgency	Negative Affect
Pos. emotionality	+	+	-
Pos. emotional reactivity	No hypothesis	No hypothesis	No hypothesis
Neg. emotionality	-	-	+
Neg. emotional reactivity 1	No hypothesis	No hypothesis	No hypothesis
Neg. emotional reactivity 2	No hypothesis	No hypothesis	No hypothesis
Self-Regulation			
Adaptability- novelty	+	+	-
Adaptability- routine	+	+	-
Attention/Distractibility			
Attention span/ Persistence	+	+	-
External distraction	-	-	+

Internal distraction	-	-	+
Interest	+	+	-

It was hypothesized that STI components would correlate with each of the ECT dimensions in the following manner, after controlling for age and gender:

Table 4

Expected Directions of STI Component and ECT Scale Correlations

Emotionality	Emotion Identification	Behaviors	Situations
Pos. emotionality	+	+	+
Pos. emotional reactivity	No hypothesis	No hypothesis	No hypothesis
Neg. emotionality	-	-	-
Neg. emotional reactivity 1	No hypothesis	No hypothesis	No hypothesis
Neg. emotional reactivity 2	No hypothesis	No hypothesis	No hypothesis
Self-Regulation			
Adaptability- novelty	+	+	+
Adaptability- routine	+	+	+
Attention/Distractibility			
Attention span/ Persistence	+	+	+
External distraction	-	-	-
Internal distraction	-	-	-
Interest	+	+	+

CBQ scales were expected to correlate with each of the ECT scales as listed below, after controlling for age and gender:

Table 5

Expected Directions of CBQ Factor and ECT Scale Correlations

	Emotion Identification	Behaviors	Situations
Effortful Control	+	+	+
Extraversion/Surgency	+	+	+
Negative Affect	_	_	_

Finally, the joint and unique predictive relationships between the STI components and each ECT scale were examined. Given the exploratory nature of this study, broad questions were addressed in lieu of specific hypotheses. Each component was expected to have a unique contribution to ECT scales when controlling for all other components, as well as age and gender.

It is important to note that this study is a subset of a larger study on the relationship between temperament, emotion understanding, and social competence. The data was collected by this author in conjunction with a team of school psychology graduate students.

Participants

This study utilized direct assessments and parent ratings of 3-6 year old students enrolled in a preschool in the Mid-Atlantic region. The participants were approximately evenly split across gender, but were ethnically diverse. Additionally, the children came from diverse socio-economic status, though many children were from upper and middle class families. Therefore, this study was expected to generalize to children of middle to high socioeconomic status who have frequent contact with diverse populations. A break down of participants who completed each of the measures utilized is as follows:

Table 6

Age and Gender Breakdowns for Completed Measures

Measure	N	Mean Age	Std. Dev.	Males	Females
STI	70	4.57	.857	38	32
CBQ	77	4.69	.888	40	37
Emotion Identification	84	4.70	.918	40	44
Situations	84	4.70	.918	40	44
Behaviors	82	4.70	.915	40	42

CBQ and STI data was available for sixty children. STI, CBQ, and all three ECT measures were available for fifty-one children . Parents of 70 children completed the STI and parents of 77 children completed the CBQ.

Families were recruited on a volunteer basis. A team member left a letter explaining the purpose of our study, parent and child time commitments, as well as contact information and a consent form in the mailbox of every child at the preschool at the beginning of the school year. The team also recruited participants by giving a brief presentation about the broader study and its potential contributions to current literature at Back to School night. During this presentation the team briefly described both parent and child measures, emphasizing that children tend to enjoy the activities and parents tend to learn a great deal about their child's temperament.

Procedures

Temperament was assessed via the Structured Temperament Interview, a newly developed measure by Hedwig Teglasi that examines quantitative and qualitative data.

Trained doctoral level graduate students in school psychology conducted the STI either over the phone or in person with one parent. The STI takes approximately one hour and fifteen minutes to complete and all conversations are recorded to facilitate note-taking in the qualitative sections. Parents were contacted to schedule their STI appointment shortly after turning in their consent form.

Emotion understanding was measured with a series of direct child assessments. The Emotion Comprehension Test, a team developed measure, examined the child's ability to identify emotions based on facial expressions, behaviors, and situations, each presented alone. The assessment utilizes photos as well as puppets. The Emotion Comprehension Test took approximately one half hour to complete, although some variability occurred given the broad range of ages represented in this study as well as the varying attention spans of children of preschool children.

The Emotion Comprehension Test was conducted during the school day. A trained doctoral graduate student in school psychology was assigned to each classroom in the preschool and took time to get to know the children in that classroom, performing a series of informal classroom observations and playing with the children. The graduate researcher was responsible for assessing all children within his or her classroom for whom consent has been obtained. After the children became comfortable with the graduate researcher, the researcher asks the child to join him or her in the "research room," a quiet room in the school used specifically for research purposes. The graduate student only assessed children who have given verbal assent in addition to having parental consent. Researchers allowed children to return to their classroom prior to finishing the assessment if they ask to return or show signs of distress or preoccupation

that results in an inability to focus on test material (separate from inattention). Data collection is ongoing as measures are needed to facilitate the research questions of the larger team.

Measures

Structured Temperament Interview (STI).

The Structured Temperament Interview is a newly developed measure (by Hedwig Teglasi) that utilizes qualitative and quantitative data to assess a child's standing on a number of temperamental domains. The STI is a structured interview that is conducted in approximately one hour and fifteen minutes with a parent rater. The 112 items are broken down into six temperamental dimensions including, Activity, Attention, Emotion, Reactivity Threshold, Approach-Avoidance/Sociability, and Self-Regulation.

The STI was chosen for its comprehensiveness as well as specificity in examining several possible dimensions of temperament. It includes commonly cited dimensions (emotion, self-regulation, approach-avoidance) as well as less often cited domains that seek to refine facets of temperament and reduce possible overlap between constructs. For more information on the rationale behind the STI domains see Teglasi, 2007.

Of particular interest to this study are the Emotion, Attention, and Self-Regulation dimensions. The Emotion dimension of the STI examines emotionality, with items which are designed to specifically focus on predominance of positive/negative emotion and positive/negative reactivity, each of which has been identified by modern research as a major tenet of emotionality. Specific components include Predominance of Positive Emotion, Positive Emotional Reactivity, Predominance of Negative Emotion, Negative

Emotional Reactivity (fear, internalizing), Negative Emotional Reactivity (anger, irritability, externalizing).

Emotion self-regulation is examined as part of the Self-Regulation dimension. The Self-Regulation dimension also encompasses cognitive self-regulation and adaptability to general routine and rules. Specific components include Adaptability to Novelty (emotional adaptability, cognitive adaptability) and Adaptability to Routine/General Self-Regulation by Rules.

The Attention dimension examines persistence and distractibility by external and internal stimuli. Specific components of this dimension include Attention Span/Persistence, External Sources of Distraction, Internal Sources of Distraction (including selective focus and shift), and Level of Interest.

Prior to its use in the study, a revised version of the original STI was piloted with several parents of preschoolers. Changes implemented after this pilot study included changes in the wording of questions and dimension introductions. These changes improved the clarity of the measure by making adjustments to ensure that the researcher and parent maintained a shared understanding of the definitions of each dimension and intent behind each item.

Child Behavioral Questionnaire (CBQ).

The Child Behavioral Questionnaire (CBQ) is a parent report of temperament that relies on quantitative data alone in the form of Likert scale ratings. The 15 scales of the CBQ include Positive Anticipation, Smiling and Laughter, High Intensity Pleasure, Activity Level, Impulsivity, Shyness, Discomfort, Fear, Anger and Frustration, Sadness, Soothability, Inhibitory Control, Attentional Focusing, Low Intensity Pleasure, and

Perceptual Sensitivity. The three overarching factors which emerge from these scales are Effortful Control, Extraversion/Surgency, and Negative Affect (Putnam & Rothbart, 2006).

Emotion Comprehension Test (ECT).

The Emotion Comprehension Test was used to assess participants' emotion understanding. The Emotion Comprehension Test is a new, team-developed measure that is largely based on Carroll Izard's ACES measure of emotion understanding. The measure is in keeping with Shultz, Izard, and Bear's (2004) definition, and assesses children's ability to label emotions based on facial expressions, behaviors, and situations. Modifications to the ACES measure were necessary to adapt its use for younger children. The wording in the situation and behavior scales to make them more appropriate to the preschool classroom. Furthermore, the ECT included the use of real-life rather than posed pictures of emotions, and utilized androgynous puppets and character names in the situations and behaviors tasks. Additionally, children are asked to explain their rationale for choosing an emotion on items wherein it is feasible that more than one emotion is appropriate.

The Emotion Identification (facial recognition) task is given first, wherein children are asked to tell if pictured children feel "happy, sad, mad, scared, or no feeling." The Emotion Identification task is followed by the Behavior task. In this task children are read a series of vignettes which describe various behaviors enacted by androgynous child characters. Behaviors include looking down, walking slowly, skipping, etc. The vignettes are read by the examiner, who simultaneously acts out the behaviors with an androgynous puppet. Again, children are asked to tell whether the

character feels “happy, sad, mad, scared, or no feeling.” The Situations task is presented last, wherein the vignettes describe situations rather than behaviors. Vignettes are again acted out by puppets and children are asked to choose between five possible emotion options. In both the Behaviors task and Situations tasks items are included wherein there could feasibly be more than one correct response (mad or sad, for example). For these items, children are asked to explain why they chose the response they did with the prompt “You said Puppet feels X. Tell me more about Puppet feeling X.” These qualitative responses will be compared in later studies to parent ratings of temperament.

As the Emotion Comprehension Test is a new measure, work must be done to examine its psychometric properties and validity. A study being conducted simultaneously by another team member will inform issues in these areas. Limited data already exists which suggests that the scales are appropriately correlated with one another as well as with outcomes on other measures (Gustafson, 2009; Teglasi, Gustafson, Genova, & Schussler, 2008).

Chapter 4: Results

Data Analyses

Analyses explored the properties of the STI, CBQ, and ECT as well as the relations among them. Initially, principal components analyses were conducted to identify viable components of each of the STI dimensions to be used. The components emerging from the principal components analyses were used in subsequent correlational and multiple regression analyses. The next set of analyses examined the bivariate relationships between the STI and CBQ factors with one another, as well as with scales of the ECT.

Multiple regressions were performed using the factors emerging from the principal components analyses as the independent variables. Multiple regressions were first conducted separately for the components within each of the three STI dimensions to determine their separate and joint contributions to the ECT. A similar set of analyses was conducted for each of the three CBQ factors and their subcomponents to ascertain the unique and joint contributions of components to each ECT scale.

Principal Components Analyses on the STI

Principal components analyses were conducted on items within the three STI dimensions, including Emotionality, Self-Regulation, and Attention. Items were parsed out and analyzed by dimension. All analyses were run using direct oblimin rotation (as the components were expected to be correlated) with eigenvalues set at one or greater. Correlations between and within dimensions are shown in later tables. The Kaiser Meyer Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity results

for each dimension is shown below. All dimensions either met or neared meeting both of these tests. It should be noted that items within any of the dimension principal components analyses that cross loaded on multiple components were removed from analyses.

Table 7

KMO and Bartlett's Test of Sphericity for All STI Dimensions

Dimension	KMO	Bartlett's
Positive Emotionality	.703	.000
Negative Emotionality	.574	.000
Self-Regulation	.670	.000
Attention	.634	.000

Emotionality.

The Emotionality variables were treated as two distinct dimensions, including Positive Emotionality and Negative Emotionally. Positive and negatively valenced items were separated because literature suggests that the constructs are orthogonal. These constructs are separated in current measures of temperament. It should be noted that though two dimensions were created, items 34, 35 and 36 were included in both dimensions. These items, which reference modulation and alertness to surroundings, lacked valence and were therefore appropriate for both dimensions.

Table 8

Emotionality Dimension: Proposed and Actual Components

Proposed Components	Actual Components
Predominance of Positive Emotion	Low Happy States (PE) (3 items)
Positive Emotional Reactivity	Low Intensity of Reactivity of Positive Emotions (PE) (5 items)
	Low Empathy and Cooperation (PE) (2 items)
	Low Negative Reactivity/ High Appropriateness in Expression (NE) (3 items)
Predominance of Negative Emotion	High Negative Valence (NE) (3 items)
Negative Emotional Reactivity (fear, internalizing)	Low Internalizing (NE) (3 items)
Negative Emotional Reactivity (anger, irritability, externalizing)	Low Externalizing (NE) (2 items)
-	Low Alertness to Surroundings (PE) (3 items)
-	High Modulation of Excitability (NE) (3 items)
-	Low Alertness to Changes and Boredom with Surroundings (NE) (2 items)

*PE- falls in the new Positive Emotionality dimension.
NE- falls in the new Negative Emotionality dimension.

Table 9

Emotionality Components

Components	Eigenvalues	Cumulative % of Variance Explained
STI- Positive Emotions		
Low Happy States	3.181	24.468
Low Intensity of Reactivity of Positive Emotions	2.622	44.638
Low Alertness to Surroundings	1.316	54.759
Low Empathy and Cooperation	1.125	63.410
STI- Negative Emotions		
Low Externalizing	3.403	21.270
Low Internalizing	1.832	32.723
High Modulation of Excitability	1.772	43.800
High Negative Valence	1.462	52.939
Low Alertness to Changes and Boredom with Surroundings	1.277	60.920
Low Negative Reactivity/ High Appropriateness in Expression	1.024	67.321

Table 10

Emotionality Component Items

Components	STI Items	Item Factor Loadings
STI- Positive Emotions		
Low Happy States	STI 51: joyful, enthused	.840
	STI 38: predominant happy states	-.790
	STI 39: speed to positive	.705
Low Intensity of Reactivity of Positive Emotions	STI 35: when expecting positive, excited	.755
	STI 41: intensity of positive expression	.696
	STI 40: duration of positive	-.571
	STI 46: positive appropriate	.532
	STI 36: trouble settling down	-.501
Low Alertness to Surroundings	STI 37: alert to changes in surroundings	.729
	STI 53: interest in surroundings	.065
	STI 34: keyed up, excitable	.574
Low Empathy and Cooperation	STI 52: empathetic	.829
	STI 57: warmth and cooperation	.706

STI- Negative Emotions

Low Externalizing	STI 49: angry, irritable	.866
	STI 58: defiance or hostility	.756
Low Internalizing	STI 48: fearful	.759
	STI 56: worries	.676
	STI 50: sad	.507
High Modulation of Excitability	STI 36: trouble settling down	-.776
	STI 35: when expecting positive, excited	.775
	STI 34: keyed up, excitable	.569
High Negative Valence	STI 55: easy to embarrass	-.757
	STI 44: duration negative	.620
	STI 42: predominant negative	.450
Low Alertness to Changes and Boredom with Surroundings	STI 37: alert to changes in surroundings	.911
	STI 54: boredom with general surroundings	-.462
Low Negative Reactivity/ High Appropriateness in Expression	STI 43: speed to negative	.786
	STI 45: intensity negative expression	.675
	STI 47: negative appropriate	-.617

Self-Regulation.

Proposed and actual dimensions for Self-Regulation, as well as eigenvalues, percent variance explained, and STI items and factor loadings appear below.

Table 11

Self-Regulation Dimension: Proposed and Actual Components

Proposed Components	Actual Components
Emotional Adaptability to Novelty Cognitive Adaptability to Novelty	Cognitive and Emotional Flexibility (5 items)
Adaptability to Routine/ General Self-Regulation by Rules	Low Rule Governed Behavior (4 items)
-	High Tolerance for Frustration/Challenge (3 items)
-	Plans Ahead/Follows Instructions (3 items)

Table 12

Self-Regulation Components

Components	Eigenvalues	Cumulative % of Variance Explained
Cognitive and Emotional Flexibility	4.525	30.166
Low Rule Governed Behavior	1.990	43.433
High Tolerance for Frustration//Challenge	1.394	52.725
Plans Ahead, Follows Instructions	1.269	61.188

Table 13

Self-Regulation Component Items

Components	STI Items	Item Factor Loadings
Cognitive and Emotional Flexibility	STI 110: rules vs. reminders	.779
	STI 109: rules vs. consequences	.751
	STI 97: anticipates others' reactions	.726
	STI 98: organized, systematic behavior	.653
	STI 111: important, decisions thoughtful	-.448
Low Rule Governed Behavior	STI 103: accepts departure from expectation	.822
	STI 102: accepts postponed positive	-.733
	STI 104: accepts changes in routine	.639
	STI 105: not discouraged by challenge	-.569
High Tolerance for Frustration/ Challenge	STI 108: comfort with peer demands	.815
	STI 107: comfort with home limits or routines	.713
	STI 106: comfort with school limits or routines	.616
Plans Ahead/ Follows Instructions	STI 112: plans for next day	-.758
	STI 101: follows implicit rules	.614
	STI 100: follows clear implicit instructions	.597

Attention.

Proposed and actual dimensions for the Attention dimension, as well as eigenvalues, percent variance explained, and STI items and factor loadings appear below.

Table 14

Attention Dimension: Proposed and Actual Components

Proposed Components	Actual Components
Attention Span/Persistence	Low Duration of Attention (3 items)
External Sources of Distraction	High Distraction by External Stimuli (3 items)
	High Distraction by Less Relevant Information (3 items)
Internal Sources of Distraction	Low Distraction by Internal Thoughts (2 items)
Interest	Low Range of Interest (3 items)

Table 15

Attention Components

Components	Eigenvalues	Cumulative % of Variance Explained
High Distraction by External Stimuli	4.339	30.992
Low Range of Interest	1.765	43.602
High Distraction by Less Relevant Information	1.434	53.846
Low Duration of Attention	1.194	62.374

Low Distraction by Internal Thoughts	1.085	70.127

Table 16

Attention Component Items

Components	STI Items	Item Factor Loadings
High Distraction by External Stimuli	STI 10: distract by external, chosen	-.731
	STI 9: distract sounds and sights	-.730
	STI 12: distract by external from assignment	-.729
Low Range of Interest	STI 30: range of interest	.842
	STI 32: quality of interest in general	.654
	STI 33: absorbed not selected	.594
High Distraction by Less Relevant Information	STI 19: screens out less relevant	.873
	STI 17: distract from focus by unimportant info	.713
	STI 18: distract by less central details when telling story	-.579
Low Duration of Attention	STI 24: duration of conversation	.815
	STI 25: duration seatwork in class	.733
	STI 27: duration when asked to do something	.576
Low Distraction by Internal Thoughts	STI 13: distraction by thoughts general	.930

STI 14: distraction by thoughts, independent work	.789

Correlations with Age and Gender

The STI, CBQ, and ECT were each examined as they relate to age and gender as shown in Table 17 below.

Table 17

STI Correlated with Age and Gender

STI Dimension	Age	Gender
STI- Positive Emotions		
Low Happy States	.052	-.040
Low Intensity of Reactivity of Positive Emotions	.012	-.109
Low Alertness to Surroundings	-.071	-.005
Low Empathy and Cooperation	-.043	-.099
STI- Negative Emotions		
Low Externalizing	.158	.007
Low Internalizing	-.120	.111
High Modulation of Excitability	.005	.034
High Negative Valence	.318**	-.155
Low Alertness to Changes and Boredom with Surroundings	.002	-.015
Low Negative Reactivity/High Appropriateness in Expression	.016	-.048
Self-Regulation		

Cognitive and Emotional Flexibility	.252*	-.220
Low Rule Governed Behavior	-.021	.056
High Tolerance for Frustration and Challenge	.010	.032
Plans Ahead, Follows Instructions	.034	-.004
STI-Attention/Distractibility		
High Distraction by External Stimuli	-.186	.077
Low Range of Interest	.055	-.014
High Distraction by Less Relevant Information	-.048	.249*
Low Duration of Attention	-.025	.056
Low Distraction by Internal Thoughts	-.106	-.085

** p<.01, *p<.05

Table 18

CBQ Correlated with Age and Gender

CBQ Dimension	Age	Gender
Effortful Control	*-.106*	*.057*
Perceptual Sensitivity	.042	.073
Smiling and Laughter	-.037	.008
Low Intensity Pleasure	-.279*	.122
Falling Reactivity/Soothability	-.277*	.086
Inhibitory Control	-.059	.001
Attentional Focusing	.162	-.050

Extraversion/Surgency	*.159*	*-.020*
Impulsivity	-.018	-.083
Activity Level	.062	-.174
High Intensity Pleasure	.127	.028
Shyness	.082	-.017
Approach/Positive Anticipation	.162	.053
Negative Affect	*.347***	*.177*
Sadness	.354**	.022
Anger/Frustration	.160	.070
Fear	.189	.080
Discomfort	.300**	.243*

** p<.01, *p<.05

Table 19

ECT Correlated with Age and Gender

ECT Scale	Age	Gender
Emotion Identification (pictures)	.289*	-.250*
Situations	.401**	-.084
Behaviors	.383**	.-.091

** p<.01, *p<.05

Correlations of the STI, CBQ, and ECT

A series of correlational analyses were run to determine the association within and between components and/or scales of the STI, CBQ, and ECT.

Pearson correlations were run to assess relationships between the three broad factors of the CBQ. As noted in Table 19, Effortful Control and Extraversion/Surgency were significantly negatively correlated as were Effortful Control and Negative Affect. Extraversion/Surgency and Negative Affect were significantly positively correlated.

Table 20

Intercorrelations of the CBQ

	Effortful Control	Extraversion/Surgency	Negative Affect
Effortful Control	NA	-.311**	-.281*
Extraversion/Surgency		NA	.319**
Negative Affect			NA

** p<.01, *p<.05

Pearson correlations were also run to assess the relationships within and between the dimensions of the STI. Table 21 shows the relationships between the components of Emotionality, including both the Positive and Negative Emotionality dimensions.

Table 21

Emotionality Within Dimension Component Correlations

Positive Emotions	L Happy States	L Intensity of Reactivity of P Emotions	L Alertness to Surroundings	L Empathy and Cooperation	Negative Emotions	L Externalizing	L Internalizing	H Modulation of N Excitability	H N Valence	L Alertness to Changes and Boredom with Surroundings	L N Reactivity/ H Appropriateness of Expression
L Happy States	NA	.284*	.301*	.125		-.189	-.444**	.055	.357**	.102	-.315**
L Intensity of Reactivity of P Emotions		NA	.265*	-.169		.048	-.040	.644**	.140	.013	-.079
L Alertness to Surroundings			NA	-.039		.060	-.076	.435**	-.072	.608**	.029
L Empathy and Cooperation				NA		-.243*	-.184	-.374**	.231	.116	-.161
Negative Emotions											
L Externalizing						NA	.275*	.388**	-.272*	-.203	.409**
L Internalizing							NA	.087	-.311**	-.159	.218
H Modulation of Excitability								NA	-.197	-.048	.234
H N Valence									NA	.101	-.317**
L Alertness to Changes and Boredom with Surroundings										NA	-.020
L N Reactivity/H Appropriateness in Expression											NA

** p<.01, *p<.05, P-positive, N-negative, L-low, H-high. N= 70.

Table 22 shows the relationships between the components of self-regulation.

Table 22

Self-Regulation: Within Dimension Component Correlations

Self-Regulation	Cognitive and Emotional Flexibility	Low Rule Governed Behavior	High Tolerance for Frustration and Challenge	Plans Ahead, Follows Instructions
Cognitive and Emotional Flexibility	NA	.216	-.062	-.216
Low Rule Governed Behavior		NA	-.182	-.375**
High Tolerance for Frustration and Challenge			NA	.057
Plans Ahead, Follows Instructions				NA

** p<.01, *p<.05

Table 23 shows the relationships between the components of attention.

Table 23

Attention: Within Dimension Component Correlations

Attention/Distractibility	High Distraction by External Stimuli	Low Range of Interest	High Distraction by Less Relevant Information	Low Duration of Attention	Low Distraction by Internal Thoughts
High Distraction by External Stimuli	NA	.272*	.384**	.463**	-.349**
Low Range of Interest		NA	.264*	.167	-.076
High Distraction by Less Relevant Information			NA	.346**	-.405**
Low Duration of Attention				NA	-.360**
Low Distraction by Internal Thoughts					NA

** p<.01, *p<.05

In addition to examining within dimension correlations, Pearson correlations were run to examine the relationships between the STI dimensions and components. Table 24 shows the relationship between Positive and Negative Emotionality components and the Self-Regulation. Table 25 shows the relationship with Attention. Table 26 shows the relationship between Self-Regulation and Attention.

Table 24

STI Between Dimension Component Correlations- Positive Emotionality and Self-Regulation

Positive Emotionality	*Self-Regulation*	Cognitive and Emotional Flexibility	Low Rule Governed Behavior	High Tolerance for Frustration and Challenge	Plans Ahead, Follows Instructions
Low Happy States		.103	.078	-.364**	.052
Low Intensity of Reactivity of Positive Emotions		.160	-.042	.124	.169
Low Alertness to Surroundings		.078	.104	.071	-.023
Low Empathy and Cooperation		.121	.336**	-.201	-.076
Negative Emotions					
Low Externalizing		-.108	-.421**	.383**	.265*
Low Internalizing		.001	-.128	.366**	.192
High Modulation of Excitability		.099	-.168	.209	.246*
High Negative Valence		-.133	-.007	-.444**	.197
Low Alertness to Changes and Boredom with Surroundings		.040	.219	-.055	-.306*
Low Negative Reactivity/High Appropriateness in Expression		-.088	-.230	.365**	-.124

** p<.01, *p<.05

Table 25

STI Between Dimension Component Correlations- Positive Emotionality and Attention/Distractibility

Positive Emotionality	*Attention/ Distractibility*	High Distraction by External Stimuli	Low Range of Interest	High Distraction by Less Relevant Information	Low Duration of Attention	Low Distraction by Internal Thoughts
Low Happy States		.138	.435**	.085	.168	-.102
Low Intensity of Reactivity of Positive Emotions		-.245*	-.003	-.109	-.116	-.117
Low Alertness to Surroundings		-.012	.276*	-.052	.097	-.317**
Low Empathy and Cooperation		.384**	.249*	.353**	.277*	-.207
Negative Emotions						
Low Externalizing		-.234	-.103	-.268*	-.405**	.243*
Low Internalizing		-.202	-.262	-.217	-.056	.168
High Modulation of Excitability		-.298*	-.068	-.334**	-.365**	.035
High Negative Valence		.118	.189	.010	.163	.357**
Low Alertness to Changes and Boredom with Surroundings		.138	.167	.213	.377**	-.492**
Low Negative Reactivity/High Appropriateness in Expression		-.153	-.034	-.175	-.093	.271*

** p<.01, *p<.05

Table 26

STI Between Dimension Component Correlations- Self-Regulation and Attention

Self-Regulation	High Distraction by External Stimuli	Low Range of Interest	High Distraction by Less Relevant Information	Low Duration of Attention	Low Distraction by Internal Thoughts
Cognitive and Emotional Flexibility	.019	-.097	.053	.145	-.251*
Low Rule Governed Behavior	.314**	.178	.451**	.309**	-.451**
High Tolerance for Frustration and Challenge	-.460**	-.294*	-.235	-.247*	.106
Plans Ahead, Follows Instructions	-.370**	-.150	-.313**	-.369**	.320**

** p<.01, *p<.05

Between scale correlations of the ECT are shown below.

Table 27

ECT Between Scale Correlations

	Emotion Identification	Situations	Behaviors
Emotion Identification	NA	.258*	.056
Situations		NA	.474**
Behaviors			NA

** p<.01, *p<.05

The relationship between STI components and the three broad scales of the CBQ are reported below, also using Pearson correlations.

Table 28

STI Component and CBQ Factor Correlations

Positive Emotions	Effortful Control	Extraversion/Surgency	Negative Affect
Low Happy States	-.288*	.135	.245
Low Intensity of Reactivity of Positive Emotions	.094	-.185	-.075
Low Alertness to Surroundings	-.003	-.176	-.085
Low Empathy and Cooperation	-.363**	.026	.031
Negative Emotions			
Low Externalizing	.463**	-.426**	-.407**
Low Internalizing	.330**	.012	-.409**
High Modulation of Excitability	.328*	-.399**	-.311*
High Negative Valence	-.431**	.162	.451**
Low Alertness to Changes and Boredom with Surroundings	-.164	-.010	.074
Low Negative Reactivity/High Appropriateness in Expression	.367**	-.446**	-.538**
Self-Regulation			
Cognitive and Emotional Flexibility	.029	.081	-.025
Low Rule Governed Behavior	-.330*	.264*	.158
High Tolerance for Frustration and Challenge	.434**	-.269*	-.470**
Plans Ahead, Follows Instructions	.146	.125	.051
Attention/Distractibility			
High Distraction by External Stimuli	-.417**	.125	.306*
Low Range of Interest	-.151	.074	.252

High Distraction by Less Relevant Information	-.359**	.127	.222
Low Duration of Attention	-.470**	.320*	.082
Low Distraction by Internal Thoughts	.241	-.032	-.146

** p<.01, *p<.05

As age was significantly correlated with all scales of the ECT, correlations between the ECT and other measures were run two ways, with and without controlling for age. Below, numbers outside of parentheses represent correlations without controlling for age. Numbers in parenthesis represent correlations after controlling for age. In the case of Emotion Identification, the number in parentheses represents correlations after controlling for both age and gender, as both had a significant influence on scores on this subscale.

Table 29

STI Component and ECT Scale Correlations

Positive Emotions	Emotion Identification	Situations	Behaviors
Low Happy States	-.128 (-.171)	-.121 (-.155)	-.033 (-.058)
Low Intensity of Reactivity of Positive Emotions	.030 (.017)	-.268* (-.298*)	-.208 (-.231)
Low Alertness to Surroundings	-.145 (-.127)	-.023 (.006)	-.014 (.015)
Low Empathy and Cooperation	-.147 (-.168)	-.045 (-.030)	.365** (.413*)
Negative Emotions			
Low Externalizing	.024 (.004)	.093 (.033)	.095 (.038)
Low Internalizing	-.055 (.003)	.078 (.139)	-.162 (-.127)
High Modulation of Excitability	.093 (.096)	-.133 (-.147)	-.283* (-.308*)
High Negative Valence	.259 (.165)	.158 (.035)	.347** (.256)

Low Alertness to Changes and Boredom with Surroundings	-.200 (-.212)	-.084 (-.093)	.104 (.112)
Low Negative Reactivity/High Appropriateness in Expression	-.006 (-.017)	.025 (.020)	-.009 (-.016)
Self-Regulation			
High Cognitive and Emotional Flexibility	-.029 (-.153)	-.144 (-.276*)	-.022 (-.133)
Low Rule Governed Behavior	-.137 (-.131)	-.271* (-.287*)	-.133 (-.135)
High Tolerance for Frustration and Challenge	-.041 (-.032)	-.001 (-.006)	-.051 (-.060)
Plans Ahead, Follows Instructions	.051 (.043)	.242 (.249)	.229 (.234)
Attention/Distractibility			
High Distraction by External Stimuli	-.171 (-.108)	-.311** (-.263*)	-.296* (-.247)
Low Range of Interest	-.140 (-.172)	.113 (.099)	-.055 (-.083)
High Distraction by Less Relevant Information	-.325* (-.285*)	-.207 (-.205)	-.087 (-.075)
Low Duration of Attention	-.131 (-.147)	-.101 (-.100)	.159 (-.162)
Low Distraction by Internal Thoughts	-.006 (.026)	.064 (.117)	.033 (.080)

** p<.01, *p<.05

Correlations between the CBQ and the ECT were run in a similar manner, as seen in Table 30.

Table 30

CBQ Factor and ECT Scale Correlations

	Emotion Identification	Situations	Behaviors
Effortful Control	*-.062 (-.018)*	*.123 (.182)*	*-.111 (-.077)*
Perceptual Sensitivity	-.076 (-.074)	.075 (.064)	-.083 (-.107)
Smiling and Laughter	-.009 (.015)	.158 (.188)	-.066 (-.057)
Low Intensity Pleasure	-.055 (.053)	.045 (.178)	-.214 (-.120)
Falling Reactivity/Soothability	-.168 (-.075)	-.140 (-.033)	-.223 (-.132)
Inhibitory Control	-.155 (-.146)	.073 (.106)	-.065 (-.045)
Attentional Focusing	.205 (.157)	.292* (.251*)	.167 (.115)
Extraversion/Surgency	*.097 (.044)*	*.160 (.106)*	*-.123 (-.201)*
Impulsivity	.028 (.020)	.165 (.187)	-.049 (-.046)
Activity Level	.257* (.223)	.100 (.082)	-.028 (-.057)
High Intensity Pleasure	.067 (.035)	.208 (.173)	-.099 (-.162)
Shyness	-.059 (-.093)	-.138 (-.187)	-.035 (-.072)
Approach/Positive Anticipation	.080 (.054)	.162 (.108)	-.119 (-.199)
Negative Affect	*.057 (-.004)*	*-.033 (-.200)*	*-.066 (-.230)*
Sadness	.157 (.079)	.070 (-.084)	.032 (-.120)
Anger/Frustration	.079 (.049)	-.115 (-.198)	-.207 (-.294*)
Fear	.072 (.040)	-.107 (-.203)	-.031 (-.114)

Discomfort	-.098 (-.146)	.060 (-.069)	.024 (-.103)

** p<.01, *p<.05

Regression Analyses

Regression Analyses were run with each of the three ECT scales as the dependent variable and each set of STI components as the independent variables. These analyses were conducted to discern which components within each STI dimension were most predictive of each ECT scale. In later analyses all significant STI predictors were combined into a single regression analysis for each of the three ECT scales. These analyses were meant to discern the joint contributions of significant Emotionality, Self-Regulation, and Attention components to the prediction of each of the ECT scales.

Emotion Identification.

Tables 31, 32, 33, and 34 show the results of STI dimension regressions for the Emotion Identification Scale of the ECT. Only the High Negative Valence component of the Negative Emotionality dimension and the High Distraction by Less Relevant Information component of the Attention dimension were significant in the within scale analyses. This indicates that only these components accounted for a significant amount of the variance in EID (above other components in their broad dimension). None of the regression models of the STI dimensions were significant, though the summary regression was. The summary regression only included significant components from earlier within dimension regressions.

Table 31

Summary of Regression Analyses for STI Positive Emotionality Dimension and EID

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Low Happy States	-.104	.175	-.089	-.591	.557
Low Intensity of Reactivity of Positive Emotions	-.94	.198	.071	.474	.637
Low Alertness to Surroundings	-.162	.168	-.142	-.966	.339
Low Empathy and Cooperation	-.113	.123	-.130	-.912	.366

R^2=.053, ** p<.01, *p<.05, Model p=.594

Table 32

Summary of Regression Analyses for STI Negative Emotionality Dimension and EID

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Low Externalizing	-.009	.132	-.011	-.066	.948
Low Internalizing	-.014	.138	-.015	-.100	.921
High Modulation of Excitability	.145	.157	.135	.923	.361
High Negative Valence	.309	.141	.323*	2.183	.034
Low Alertness to Changes and Boredom with Surroundings	-.220	.133	-.229	-1.660	.103
Low Negative Reactivity/High Appropriateness in Expression	.066	.148	.068	.446	.658

R^2=.142, ** p<.01, *p<.05, Model p=.264

Table 33

Summary of Regression Analyses for STI Attention Dimension and EID

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
High Distraction by External Stimuli	-.066	.139	-.076	-.478	.634
Low Range of Interest	-.038	.156	-.034	-.244	.809
High Distraction by Less Relevant Information	-.304	.135	-.351*	-2.254	.029
Low Distraction by Internal Thoughts	-.141	.112	-.191	-1.254	.216
Low Duration of Attention	-.043	.180	-.037	-.238	.813

R^2= .138, ** p<.01, *p<.05, Model p=.187

Table 34

Summary of Regression Analyses for STI Self-Regulation Dimension and EID

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Cognitive and Emotional Flexibility	-.001	.200	-.001	-.006	.995
Low Rule Governed Behavior	-.118	.123	-.149	-.957	.343
High Tolerance for Frustration and Challenge	-.060	.127	-.068	-.473	.638
Plans Ahead, Follows Instructions	-.002	.202	-.002	-.011	.991

R^2= .023, ** p<.01, *p<.05, Model p=.883

Table 35 shows the results of a summary regression, wherein only significant components from earlier regressions where included. The contributions of the Negative Emotionality component High Negative Valence and the Attention component High Distraction by Less Relevant Information were examined. Both components remain significant predictors in this model.

Table 35

Summary of Regression Analyses for STI and EID

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
High Negative Valence (Negative Emotionality)	.251	.120	.262*	2.081	.042
High Distraction by Less Relevant Information (Attention)	-.284	.109	-.327*	-2.599	.012

R^2= .174, ** p<.01, *p<.05, Model p=.007

The High Negative Valence and High Distraction by Less Relevant Information dimensions accounted for 17.4% of the variance in the EID scale. Additionally, this summary regression model was significant.

Situations.

Tables 36, 37, 38, and 39 show the results of analyses regressing components within each of the STI dimensions on the Situations scale. Only the High Distractibility by External Stimuli component of the Attention dimension and the Low Intensity of Reactivity of Positive Emotions component of the Positive Emotionality dimension showed significant unique contributions to Situations (within their dimensions). None of the STI single dimension models were significant in these analyses, though the summary regression was significant.

Table 36

Summary of Regression Analyses for STI Positive Emotionality Dimension and Situations

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Low Happy States	-.036	.107	-.048	-.340	.735
Low Intensity of Reactivity of Positive Emotions	-.245	.121	-.285*	-2.016	.049
Low Alertness to Surroundings	.047	.103	.064	.459	.648
Low Empathy and Cooperation	-.047	.075	-.084	-.625	.535

R^2=.084, ** p<.01, *p<.05, Model p= .303

Table 37

Summary of Regression Analyses for STI Negative Emotionality Dimension and Situations

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Low Externalizing	.085	.085	.161	1.007	.319
Low Internalizing	.059	.088	.096	.669	.506
High Modulation of Excitability	-.122	.101	-.175	-1.206	.233
High Negative Valence	.135	.091	.219	1.495	.141
Low Alertness to Changes and Boredom with Surroundings	-.041	.085	-.066	0.482	.632
Low Negative Reactivity/High Appropriateness in Expression	.030	.095	.047	.313	.756

R^2=.087, ** p<.01, *p<.05, Model p=.554

Table 38

Summary of Regression Analyses for STI Attention Dimension and Situations

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
High Distraction by External Stimuli	-.206	.085	-.366*	-2.429	.019
Low Range of Interest	.176	.095	.246	1.856	.069
High Distraction by Less Relevant Information	-.108	.082	-.193	-1.314	.195
Low Distraction by Internal Thoughts	-.049	.069	-.103	-.717	.476
Low Duration of Attention	.042	.110	.057	.386	.701

R^2= .170, ** p<.01, *p<.05, Model p= .072

Table 39

Summary of Regression Analyses for STI Self-Regulation Dimension and Situations

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Cognitive and Emotional Flexibility	-.061	.119	-.069	-.514	.610
Low Rule Governed Behavior	-.107	.073	-.209	-1.454	.152
High Tolerance for Frustration and Challenge	-.030	.076	-.052	-.394	.695
Plans Ahead, Follows Instructions	.128	.120	.151	1.067	.291

R^2= .103, ** p<.01, *p<.05, Model p=.207

Table 40 displays the results of the summary regression. This model included the two STI components that were significant in the dimension level analyses displayed above.

Table 40

Summary of Regression Analyses for STI and Situations

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Low Intensity of Reactivity to Positive Emotions (Positive Emotionality)	-.314	.104	-.366*	-3.011	.004
High Distractibility by External Stimuli (Attention)	-.225	.068	-.401*	-3.298	.002

R^2= .223, ** p<.01, *p<.05, Model p=.001

These components together explained 22.3% of the variance in the Situations scale. The summary regression model was significant.

Behaviors.

Tables 41, 42, 43, and 44 show the results of within dimension STI regressions for the Behaviors scale. Low Empathy and Cooperation from the Positive Emotionality dimension showed a unique contribution to the Behaviors scale. Low Externalizing, High Modulation of Excitability, and High Negative Valence of the Negative Emotionality dimension also showed significant unique contributions. Only the Negative Emotionality dimension reached significance as a whole, as did the summary regression.

Table 41

Summary of Regression Analyses for STI Positive Emotionality Dimension and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Low Happy States	-.029	.080	-.051	-.359	.721
Low Intensity of Reactivity of Positive Emotions	-.096	.090	-.150	-1.062	.293
Low Alertness to Surroundings	.030	.077	.055	.396	.694
Low Empathy and Cooperation	.146	.056	.348*	2.601	.012

R^2=.159, ** p<.01, *p<.05, Model p=.065

Table 42

Summary of Regression Analyses for STI Negative Emotionality Dimension and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Low Externalizing	.140	.059	.353*	2.384	.021
Low Internalizing	-.054	.061	-.118	-.891	.377
High Modulation of Excitability	-.183	.070	-.352*	-2.629	.011
High Negative Valence	.161	.063	.347*	2.569	.013
Low Alertness to Changes and Boredom with Surroundings	.049	.059	.106	.842	.404
Low Negative Reactivity/High Appropriateness in Expression	.032	.065	.067	.484	.631

R^2=.283, ** p<.01, *p<.05, Model p=.011

Table 43

Summary of Regression Analyses for STI Attention Dimension and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
High Distraction by External Stimuli	-.132	.069	-.313	-1.914	.061
Low Range of Interest	.016	.077	.030	.210	.834
High Distraction by Less Relevant Information	.003	.067	.007	.043	.966
Low Distraction by Internal Thoughts	-.032	.056	-.091	-.583	.563
Low Duration of Attention	-.030	.089	-.054	-.339	.736

R^2= .096, ** p<.01, *p<.05, Model p=.405

Table 44

Summary of Regression Analyses for STI Self-Regulation Dimension and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Cognitive and Emotional Flexibility	.023	.095	.035	.244	.808
Low Rule Governed Behavior	-.028	.058	-.074	-.484	.631
High Tolerance for Frustration and Challenge	-.032	.060	-.075	-.531	.598
Plans Ahead, Follows Instructions	.135	.096	.213	1.410	.165

R^2= .062, ** p<.01, *p<.05, Model p=.529

Table 45 shows the contributions of each of the components that were significant when examined as part of their respective STI dimensions. Only the High Modulation of Excitability component of the Negative Emotionality dimension did not remain significant in the summary regression analyses.

Table 45

Summary of Regression Analyses for STI and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Low Empathy and Cooperation (Positive Emotionality)	.118	054	.281*	2.193	.033
Low Externalizing (Negative Emotionality)	.138	.052	.349*	2.684	.010
High Modulation of Excitability (Negative Emotionality)	-.130	.069	-.249	-1.867	.068
High Negative Valence (Negative Emotionality)	.152	.957	.328*	2.658	.011

R^2= .320, ** p<.01, *p<.05, Model p=.001

Regression Analyses of the CBQ and ECT

Regression analyses were run between the CBQ and ECT in a similar manner as those run between the STI and ECT. The unique within scale contribution of each CBQ component to the ECT was examined. For each ECT scale a summary analysis was run incorporating all relevant significant CBQ components. A separate regression analysis was run to examine the unique contribution of the three broad CBQ factor scale scores (as opposed to components) to each ECT scale.

Emotion Identification.

Table 46 shows the unique contributions of the three overarching CBQ factors including Negative Affect, Effortful Control, and Extraversion/Surgency. None of the factors showed a unique contribution in EID outcomes. The combined impact of these variables was not significant.

Table 46

Summary of Regression Analyses for CBQ Broad Factors and EID

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Extraversion/ Surgency	.096	.172	.080	.559	.578
Effortful Control	-.034	.157	-.031	-.219	.828
Negative Affect	.016	.101	.022	.158	.875

R^2= .011, ** p<.01, *p<.05, Model p=.889

Tables 47, 48, and 49 show the results of within scale CBQ regressions for the Emotion Identification scale. None of the individual scales offered significant contributions to EID scores.

Table 47

Summary of Regression Analyses for CBQ Extraversion/Surgency Scale and EID

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Impulsivity	-.005	.135	-.010	-.035	.972
High Intensity Pleasure	.051	.088	.119	.583	.562
Activity Level	.014	.134	.032	.102	.919
Shyness	.019	.071	.043	.265	.792
Approach/Positive Anticipation	.101	.100	.171	1.015	.314

R^2= .066, ** p<.01, *p<.05, Model p= .492

Table 48

Summary of Regression Analyses for CBQ Effortful Control Scale and EID

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Perceptual Sensitivity	.145	.113	.202	1.281	.205
Smiling and Laughter	.010	.076	.019	.133	.895
Low Intensity Pleasure	-.119	.119	-.160	-1.006	.318
Falling Reactivity/Soothability	-.011	.089	-.022	-.128	.899
Inhibitory Control	-.004	.108	-.009	-.042	.967
Attentional Focusing	.038	.112	.065	.341	.735

R^2= .037, ** p<.01, *p<.05, Model p= .875

Table 49

Summary of Regression Analyses for CBQ Negative Affect Scale and EID

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Sadness	-.022	.106	-.037	-.207	.837
Anger/Frustration	.037	.061	.094	.599	.551
Fear	-.015	.073	-.028	-.209	.835
Discomfort	-.096	.085	-.196	-1.130	.263

R^2= .040, ** p<.01, *p<.05, Model p=.624

As no components or overarching factors offered significant contributions to the EID scale, summary regression analyses were not run.

Situations.

Table 50 examines the contributions of the three broad CBQ factors as each relates to Situations outcomes. None of the broad factors were significant in this analysis, nor was the overall model.

Table 50

Summary of Regression Analyses for CBQ Broad Factors and Situations

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Extraversion/Surgency	.182	.103	.234	1.762	.083
Effortful Control	.129	.094	.180	1.373	.175
Negative Affect	-.026	.061	-.057	-.432	.667

R^2= .061, ** p<.01, *p<.05, Model p=.258

Tables 51, 52, and 53 show regressions between the components of the three CBQ broad factors and the Situations scale. The Falling Reactivity/Soothability component of the Effortful Control scale offered a significant contribution to the Situations scale. None of the scale models reached significance.

Table 51

Summary of Regression Analyses for CBQ Extraversion/Surgency Scale and Situations

Variable	B	SE(B)	Beta	*T*	Sig. (*p*)
Impulsivity	-.092	.082	-.302	-1.122	.266
High Intensity Pleasure	.094	.053	.339	1.767	.082
Activity Level	.060	.081	.216	.733	.466
Shyness	.017	.043	.060	.394	.695
Approach/Positive Anticipation	.016	.061	.042	.262	.794

R^2= .122, ** p<.01, *p<.05, Model p=.112

Table 52

Summary of Regression Analyses for CBQ Effortful Control Scale and Situations

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Perceptual Sensitivity	-.016	.068	-.035	-.243	.809
Smiling and Laughter	.046	.046	.136	1.012	.315
Low Intensity Pleasure	-.098	.071	-.204	-1.387	.170
Falling Reactivity/Soothability	.130	.053	.394*	2.431	.018
Inhibitory Control	-.085	.064	-.266	-1.315	.193
Attentional Focusing	.070	.067	.185	1.048	.298

R^2= .125, ** p<.01, *p<.05, Model p= .171

Table 53

Summary of Regression Analyses for CBQ Negative Affect Scale and Situations

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Sadness	-.016	.068	-.043	-.238	.812
Anger/Frustration	.001	.039	.003	.022	.982
Fear	.025	.047	.072	.539	.592
Discomfort	-.037	.054	-.118	-.689	.493

R^2= .020, ** p<.01, *p<.05, Model p= .858

As only one component was significant in any of the above analyses, it was not necessary to run a summary regression analysis.

Behaviors.

Table 54 examines the three CBQ broad factors as they relate to the Behaviors scale. Again, none of the CBQ factors provided a significant contribution to the Behaviors scale. The overall model was also not significant.

Table 54

Summary of Regression Analyses for CBQ Broad Factors and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Extraversion/Surgency	-.091	.082	-.157	-1.114	.270
Effortful Control	-.096	.075	-.179	-1.284	.204
Negative Affect	-.023	.048	-.067	-.477	.635

R^2= .044, ** p<.01, *p<.05, Model p= .465

Tables 55, 56, and 57 show regressions between the components of the three CBQ broad factors and the Behaviors scale. The Smiling and Laughter component of the Effortful Control scale showed a significant contribution to Behaviors outcomes as did the High Intensity Pleasure component. The overall Extraversion/Surgency factor reached significance.

Table 55

Summary of Regression Analyses for CBQ Extraversion/Surgency Scale and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Impulsivity	-.065	.062	-.285	-1.060	.293
High Intensity Pleasure	.109	.040	.523*	2.731	.008
Activity Level	-.007	.061	-.033	-.114	.910
Shyness	.006	.032	.028	.186	.853
Approach/Positive Anticipation	.048	.045	.169	1.065	.291

R^2= .189, ** p<.01, *p<.05, Model p= .021

Table 56

Summary of Regression Analyses for CBQ Effortful Control Scale and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Perceptual Sensitivity	.019	.053	.054	.356	.723
Smiling and Laughter	.081	.036	.317*	2.270	.027
Low Intensity Pleasure	-.076	.055	-.209	-1.365	.177
Falling Reactivity/Soothability	-.049	.042	-.199	-1.174	.245
Inhibitory Control	.067	.050	.284	1.341	.185
Attentional Focusing	-.033	.052	-.115	-.622	.536

R^2= .119, ** p<.01, *p<.05, Model p= .242

Table 57

Summary of Regression Analyses for CBQ Negative Affect Scale and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Sadness	-.004	.053	-.013	-.069	.945
Anger/Frustration	.012	.031	.062	.380	.705
Fear	-.002	.037	-.008	-.060	.953
Discomfort	-.002	.042	-.008	-.042	.967

R^2= .003, ** p<.01, *p<.05, Model p= .007

The summary analyses for all significant within scale CBQ components regressed on behavior yielded a significant model. However, only the High Intensity Pleasure component remained significant.

Table 58

Summary of Regression Analyses for CBQ and Behaviors

Variable	B	SE(B)	Beta	*t*	Sig. (*p*)
Smiling and Laughter (Effortful Control)	.024	.031	.094	.777	.440
High Intensity Pleasure (Extraversion/Surgency)	.073	.025	.349	2.878	.005

R^2= .153, ** p<.01, *p<.05, Model p= .005

Chapter 5: Discussion

This study examined the temperamental dimensions of emotionality, self-regulation, and attention as they relate to one another, as well as they relate to emotion understanding. The following discussion reviews the correlational relationships between these dimensions as measured by both the STI and CBQ. Subsequent discussion reviews their unique and joint influence on emotion understanding, as measured by the ECT. Additionally, comparisons between STI and CBQ outcomes are made.

Principal Components Analyses of the STI

None of the three STI dimensions maintained their originally proposed component structure. Although the dimensions retained several proposed components, there was also a significant amount of reorganizing and splitting. It is important to note that although the component composition of the broad dimensions changed, individual items that were originally grouped together tended to remain together after analyses. The splitting and merging of components within dimensions is interesting, as the data speaks to the utility and validity of the STI as a measure of temperament, as well as to the definitions of the constructs themselves.

As was previously noted, the Emotionality dimension was originally conceptualized as one dimension comprised of two subscales (a positively valenced and negatively valenced scale). Given that positive and negative emotionality are such distinct constructs (measuring emotional surgency on different ends of the emotional spectrum), positively and negatively valenced items were separated in analyses. Several of the items were neutral and pertained to modulation of emotion and alertness to surroundings. These items were included in the analyses of both dimensions.

Positive Emotionality was originally thought to be comprised of Predominance of Positive Emotion and Positive Emotional Reactivity. In this conceptualization, Teglasi included elements of mood as well as reactivity, both of which are commonly included in the definition of emotionality (Denham, Mason, Caverly, Schmidt, Hackney, Caswell, & DeMulder, 2001; Liew, Eisenberg, & Reiser, 2004; Sakimura, Dang, Ballard, & Hansen, 2008; Schultz, Izard, & Bear, 2004). Altough Teglasi's mood dimension emerged of analyses as the renamed Low Happy States component, her reactivity dimension was divided into three new components. These components included Low Intensity of Reactivity of Positive Emotions, Low Empathy and Cooperation, and Low Negative Reactivity/High Appropriateness in Expression. These components encompass two of the three facets of emotionality. Definitions of emotionality include predominance of mood, as well as regulation and reactivity. Low Happy States attends to mood. Low Intensity of Reactivity of Positive Emotions, Low Empathy and Cooperation, and Low Negative Reactivity/High Appropriateness of Expression all attend to reactivity. Specifically, these components examine the strength of a child's reaction, the valence of the reaction, and the appropriateness of the reaction. It seems that in addition to encompassing the mood and reactivity facets of emotionality, Teglasi's dimension further breaks down reactivity into separate components.

The Negative Emotionality dimension was originally comprised of Predominance of Negative Emotion, Negative Emotional Reactivity (fear, internalizing), and Negative Emotional Reactivity (anger, irritability, externalizing) among other subscales. The aforementioned components held in analyses, and were renamed High Negative Valence, Low Internalizing, and Low Externalizing respectively. These components fit into the

mood and reactivity pieces of the broader definition of emotionality, and are supported by research regarding the facets of emotionality.

Two additional components emerged of analyses of the Negative Emotionality dimension, including Low Alertness to Changes and Boredom with Surroundings and High Modulation of Excitability. Although the latter refers to regulation, the former does not map cleanly onto the theoretical definition of emotionality. It is interesting that a regulation component emerged of analyses, as Teglasi largely relegated regulation to the Self-Regulation dimension, with its own items and proposed components. Emotional regulation was included among the Negative Emotionality items to explore its link with the Emotionality construct. It was suggested earlier that including regulation in the definition and study of emotionality may cloud results, as regulation may be more clearly examined in the context of Self-Regulation. However, the definition of regulation within the emotionality domain differs from traditional definitions of self-regulation in that it refers to reactivity. Reactivity and its regulation may be subsumed under Emotionality and subsequently under temperament. In fact, Teglasi asserts that domains of temperament may each have their own subdimensions of reactivity, of which this may be one (Teglasi et al, 2009).

It is important to note that several items were included in both the Positive and Negative Emotionality dimension, as these items did not have a particularly positive or negative valence. Interestingly, the three new components, High Modulation of Excitability, Low Alertness to Changes and Boredom with Surroundings, and Low Alertness to Surroundings (a positive emotionality component) were those comprised of these emotionally neutral (non-valenced) items.

The Self-Regulation dimension included three proposed components: Adaptability to Routine/General Self-Regulation by Rules (dually encompassing cognitive and behavioral self-regulation), Emotional Adaptability to Novelty (emotional self-regulation), and Cognitive Adaptability to Novelty (cognitive self-regulation). The first of these components remained after analyses in the form of the renamed Low Rule Governed Behavior component. However, the latter two proposed components were merged into one and were named Cognitive and Emotional Flexibility. It is unclear at this point whether additional items and specificity in the dimensions would help to retain the separation between emotional and cognitive self-regulation, or if the constructs themselves may be more intertwined than was previously thought. This is a particularly interesting merge, given that it is cognitive and behavioral self-regulation that are most often joined together in research, rather than cognitive and emotional regulation.

In addition to the two aforementioned components, new components High Tolerance for Frustration/Challenge and Plans Ahead/Follows Instructions emerged in analyses. The former addresses not only one's ability to regulate a reaction, but the offensiveness of the situation and thus one's tolerance to it. It is interesting, though sensible, that the inherent stress of a situation should be measured, instead of merely examining one's ability to react out of context. This construct is not, however, typically discussed in the self-regulation literature. Plans Ahead/Follows Instructions, although it addresses future-oriented behavior and its influence on regulation, still falls within the cognitive self-regulation category.

With regard to the Attention dimension, though four components were proposed, five emerged of principal components analyses. Attention Span/Persistence, Internal

Sources of Distraction, and Interest saw new parallel components in the form of Low Duration of Attention, Internal Sources of Distraction, and Low Range of Interest, respectively. External Sources of Distraction, however, was broken down into two dimensions, High Distraction by External Stimuli and High Distraction by Less Relevant Information. The latter was initially included as a construct in the STI, but classified under the component Distraction by External Stimuli. The distinction between the two dimensions lies in separating the influence of distracting and irrelevant general stimuli (surroundings) and information (i.e. in a story). In all, duration of attention, internal and external distraction, and interest were encompassed by Teglasi's items, all commonly cited parts of the definition of attention.

Overall, it appears that Teglasi's conceptualization of emotionality, self-regulation, and attention were largely accurate (as compared to construct definitions in recent literature) and specific. Additionally, Teglasi was able to organize her items in such a way that overlap between constructs, a common flaw in many measures and studies of temperament, was greatly reduced. The principal components analyses reviewed here largely offers support for Teglasi's three broad dimensions, though they do offer some small areas for further refinement within each dimension.

Correlations with Age and Gender

Overall, the STI and CBQ showed little correlation with age and gender, though some correlation was evident on independent components sub-scales. The general lack of correlation with age and gender was expected, as both the STI and CBQ are measures of temperament, which is generally considered to be stable across an individual's lifetime (Goldsmith, Buss, Plomin, Rothbart, Thomas, Chess, Hinde, & McCall, 1997; Sanson,

Hemphill, & Smart, 2004). Additionally, the age range examined by this study was quite small.

In the case of the STI, gender was significantly positively correlated with the High Distraction by Less Relevant Information component of Attention suggesting that girls are more likely than boys to be distracted by irrelevant information. This is surprising, given that most research suggests that boys have more attentional difficulties than girls (Bauermeister et al, 2007). Although broad attentional difficulties were not assessed by the STI, this comparison is interesting. The above component was not correlated with age, suggesting that there is little development of this particular skill in the assessed ages of three to six years. DELETE THIS PARAGRAPH

Age correlated significantly and positively with High Negative Valence on the Negative Emotionality Dimension and with Cognitive and Emotional Flexibility on the Self-Regulation Dimension of the STI. It is possible that ability to mask negative emotions is a function of self-regulation and grows with age. The significant positive correlation with Cognitive and Emotional Flexibility is expected. Children's cognitive and emotional self-regulation improve with age and cognitive capacity (Carlson & Wong, 2007; Jahromi & Sifter, 2008).

On the CBQ, gender correlated significantly and positively only with the Discomfort scale, which is part of the Sadness factor, suggesting that girls are more likely than boys to score highly on this scale. The results here are unexpected. It is important to note, however, that this correlation is the only significant one among many, suggesting that the broader scales fall in line with that which would be expected Age correlated significantly and negatively with the Low Intensity Pleasure and Falling Reactivity and

Soothability scales of the Effortful Control factor. Age also correlated significantly and positively with the Negative Affect factor as a whole, as well as the Sadness and Discomfort subscales.

All subscales of the ECT showed significant positive correlations with age, offering support for the idea that all facets of emotion understanding improve significantly with age (and specifically between the ages of three and six). These results are commensurate with those discussed previously (Gustafson, 2009).Gender was significantly positively correlated with the Emotion Identification dimension of the ECT, suggesting that gender related issues may have an impact on a child's ability to identify the emotions on faces, but not on their ability to identify emotions based on behavioral or situational cues.

Within Dimension Correlations of the STI

The within-measure correlations between the dimensions and components of the STI, CBQ, and ECT were examined. With regard to the STI, within the Positive Emotionality dimension correlations tended to be significant as would be expected given the reviewed literature. Mood based components were significantly correlated with most reactivity components (with the notable exception of the Low Empathy and Cooperation component. This component did not correlate with any of the Positive Emotionality components, indicating that it might not be well suited for this particular dimension). Mood components also correlated with the new component Low Alertness to Surroundings, giving some validity to that component's presence in this dimension of the STI. Thus, for example, a child with higher levels of negative mood might have lower intensity of reactions to positive situations and lower alertness to surroundings.

Similarly, Low Alertness to Surroundings correlated significantly with a reactivity component and mood component, indicating that low levels of alertness are related to low positive mood and low intensity of reactions.

Expected patterns were found in correlational analyses of the Negative Emotionality dimension. Children with low levels of externalizing behavior were more likely to have better self regulation (High Modulation of Negative Excitability), more appropriate reactions (Low Negative Reactivity/High Appropriateness of Expression, and more positive mood (negative correlation with Predominance of Negative Emotion. Additionally, children with high scores on the Low Externalizing component were also likely to have high scores on the Low Internalizing component.

The Low Internalizing component correlated significantly with only one other component, showing a negative relationship with High Negative Valence, a mood component. This suggests that children with low levels of internalization also demonstrate lower levels of negative mood, as would be expected.

Surprisingly, the High Modulation of Negative Excitability component, a mood component, correlated significantly only with the Low Externalizing component as was described above. This component showed no other significant relationships with Negative Emotionality dimensions. It was expected that this component would have correlated negatively with High Negative Valence and positively with Low Negative Reactivity/High Appropriateness of Expression.

Within the Self-Regulation dimension, the High Cognitive and Emotional Flexibility component did not correlate significantly with any other subscales in that area. This is surprising, as this domain was expected to correlate significantly and positively

with High Tolerance for Frustration. Although in some ways it is positive that this component measures a construct different from the other subscales in Self-Regulation, it is unclear why this predicted relationships did not come to fruition. Given that cognitive and emotional self-regulation are separated in literature reviews and considered to be different constructs, it is possible that their combination here has influenced that dimension's relationships with others. Separating cognitive and emotional flexibility may provide a clearer picture of the relationship of each with different constructs. High Tolerance for Frustration also failed to correlate significantly with any other Self-Regulation components. This is not entirely surprising, as no relationships were hypothesized for this new subscale.

Low Rule Governed Behavior was expected to show a significant negative correlation with High Tolerance for Frustration, however, no relationship was apparent. This component did correlate negatively with Plans Ahead, Follows Instructions, as would be expected given that the two are near, if not complete, opposites. DELETE THIS PARAGRAPH

Many of the within dimension correlations for the Attention dimension emerged as expected. This may be a result of the fact that Attention is one of the most researched and most measured facets of temperament. The High Distractibility by External Stimuli correlations emerged exactly as would be expected. Significant positive correlations were shown with Low Range of Interest, High Distractibility by Less Relevant Information, and Low Duration of Attention. Additionally, a significant negative correlation was shown with Low Distraction by Internal Thoughts. These findings support the notion that

subscales measure clear, non-overlapping constructs, and attend to the overall definition of attention.

The Low Range of Interest component correlated significantly and positively with High Distraction by External Stimuli, as noted above, as well as with High Distraction by Less Relevant Information. Both of these relationships were expected. However, no relationship was shown with Low Duration of Attention, where a significant positive correlation would have been expected. Additionally, no relationship was shown with Low Distractibility by Internal Thoughts, though literature is less clear on whether a relationship between these two constructs exists.

High Distractibility by Less Relevant Information showed significant positive correlations with Low Duration of Attention and significant negative correlations with Low Distraction by Internal Thought. Significant positive correlations also existed with Low Range of Interest and High Distractibility by External Stimuli. All of these correlations were expected given the nature of the construct and previous research, offering positive support for the construction and utility of this component.

Low Duration of Attention correlated significantly and positively with High Distractibility by External Stimuli and High Distractibility by Less Relevant Information, as would be expected. A negative significant relationship appeared with Low Distractibility by Internal Thoughts.

Between Dimension Correlations of the STI

Correlational analyses were run between components of each STI dimension (i.e. Positive Emotionality subscales with Self-Regulation subscales). Generally, the significance and directionality of relationships matched that which would be expected

given the nature of the components and work by previous researchers (Goldsmith et al, 1997; Putnam & Rothbart, 2006; Rothbart, 2007; Rothbart & Putnam, 2006; Rowe & Plomin, 1977). Some relationships did not reach significance, but showed appropriate directionality. In many cases, these relationships may have reached significance had a larger sample been available. It is important to note that the findings here cannot be directly compared to the earlier hypothesis, as new scales emerged of principal components analyses.

Between Scale Correlations of the CBQ

As the CBQ is an established measure of temperament for which multiple reliability and validity studies have already been conducted, correlational analyses were conducted only on the three broad scales of the measure, including Extraversion/ Surgency, Effortful Control, and Negative Affect. All between scale correlations were significant and in the expected direction. In this population, Extraversion/ Surgency was positively correlated with Negative Affect. It is unclear why this relationship emerged.

Between Scale Correlations of the ECT

The EID scale showed significant positive correlations with Situations. Situations showed significant positive correlations with both EID and Behaviors. It stands to reason that Behaviors and Emotion Identification did not correlate, as they tap into very different skill sets.

Correlations between the STI and the CBQ

As the STI and CBQ are both measures of temperament they are expected to correlate with one another to some degree. Specifically, the Positive Emotionality dimension of the STI is expected to correlate with the Extraversion/Surgency dimension

of the CBQ. The STI's Negative Emotionality dimension is expected to correlate with the Negative Affect scale of the CBQ. The Self-Regulation dimension on the STI should correlate with the Effortful Control and Negative Affect scales of the CBQ. Finally, the Attention dimension of the STI should correlate with the CBQ's Effortful Control scale. Correlational analyses were run between each of the three broad CBQ scales with the subscales of the four broad STI dimensions. No overall broad dimension scores were available for the STI dimensions, given the diverse nature of the sub components.

None of the components of the Positive Emotionality dimension showed significant relationships with the CBQ's Extraversion/Surgency scale. This is surprising, since by definition, positive emotionality is a component of Extraversion/Surgency construct. None of the Positive Emotionality components were significantly correlated to the CBQ's Negative Affect scale. Positive Emotionality and Negative Affect are thought to be orthogonal, with individuals capable of being high or low on both. Therefore, a relationship would not necessarily have been expected here. Two Positive Emotionality components correlated with the Effortful Control scale of the CBQ. Low Happy States was significantly negatively correlated with Effortful Control, as was Low Empathy and Cooperation. Both relationships make sense given previous research showing that negative emotionality correlates with low effortful control (Putnam & Rothbart, 2006). The relationship between Effortful Control (which is in part attention-based) and Low Empathy and Cooperation mirrors the relationship found between the latter and the STI's Attention dimension.

The Negative Emotionality dimension of the STI correlated as would be expected with the Negative Affect scale of the CBQ. Only Low Alertness to Change and Boredom

with Surroundings on the STI showed no relationship with CBQ Negative Affect. The CBQ Negative Affect scale was also significantly correlated with all but the Low Alertness to Change and Boredom with Surroundings of the STI's Attention dimension. This finding echoes work by current researchers (Eisenburg et al, 2009). Finally, the Low Externalizing and High Modulation of Excitability components of Negative Emotionality correlated significantly and negatively with the Extraversion/Surgency subscale of the CBQ. Given that Extraversion/Surgency is representative of Positive Emotionality and, in part, appropriateness of reactions, this stands to reason.

The Low Rule Governed Behavior component of Self-Regulation demonstrated a significant negative correlation with Effortful Control. The High Tolerance for Frustration and Challenge component showed a significant positive correlation. Both of these relationships were predicted given previous research. Notably, the Cognitive and Emotional Flexibility component did not correlate significantly with Effortful Control. More research is needed to clarify this component. It is possible that this component relates to automatic sources of regulation rather than effortfully planned. All other relationships between Self-Regulation and the CBQ scales appeared as would be expected.

The Attention components of the STI all correlated as would be expected with the Effortful Control domain of the CBQ. The only exception was Low Distractibility by Internal Thoughts which neared significance. Low Duration of Attention also correlated positively with Extraversion/Surgency as did High Distraction by External Stimuli with Negative Affect. Neither of these correlations was surprising.

Correlations between the STI and the ECT

Given that all subscales of the ECT correlated significantly with age, and that the Emotion Identification subscale also correlated with gender, correlational analyses between the ECT and STI were run in two ways. Emotion Identification and STI correlations were run both with controlling for age and gender and without controlling for these variables. ECT Situations and Behaviors scales were run with controlling for age and without controlling for age.

Overall, there were few significant correlations between the STI and ECT subscales. It is possible that rather than appear in the results of correlational analyses, which largely looked at correct versus incorrect responses on the ECT as compared to facets of temperament, relationships between the STI and ECT may be more evident in the form of response biases (i.e. children with negative affect may select negatively valenced feeling responses more often). However, response bias analyses were not conducted as part of this study. Additionally, more significant correlations between all three subscales of the ECT and the Attention dimension of the STI would have been expected, given the expected impact of attention on an individual's ability to process information. However, these relationships were also lacking. It is possible that with a larger sample size stronger correlations would have been evident for some components.

The Emotion Identification subscale, which measures a child's ability to identify another's emotion based on facial expression alone, correlated with very few STI dimensions. Emotion Identification did not correlate with any of the Positive Emotionality, Negative Emotionality, or Self-Regulation components, with or without age and gender controls. It did show a significant negative correlation with the High Distractibility by Less Relevant Information component, both with and without age and

gender controls. It is difficult to make sense of this relationship in the context of the research setting. The only information available to participants was the faces in each item's picture. All pictures were focused in closely on a child's face and limited additional "information" was available. It is unclear what the "less relevant information" may have been in this case. It is important to recall that "less relevant information" is a different component than High Distractibility by External Stimuli, which did not correlate significantly with this subtest. It is possible that in the case of this task the irrelevant information might have been distractions in learning prior to the task (i.e. day to day interactions where emotion recognition is learned).

The Situations scale did not correlate with any of the Negative Emotionality components, with or without controlling for age. It did show significant negative correlations with the Low Intensity of Reactivity of Positive Emotions with and without controls. Additionally, this subscale showed significant negative correlations with High Cognitive and Emotional Flexibility when controlling for age only, as well as with Low Rule Governed Behavior in both conditions. The only unexpected relationship is that which was shown with High Cognitive and Emotional Flexibility. In fact, it is not so much that this relationship was unexpected as that not enough research exists to have made a hypothesis with regards to the relationship. It seems reasonable, however, that understanding causal links between situations and emotions is related to cognitive and emotional flexibility.

The Situations subscale offers more information for a child to examine than the Emotion Identification scale. The child is able to use stories, including context clues, to discern what emotion a character may feel. Furthermore, information is presented in an

oral as well as visual format (items are presented as brief stories acted out by puppets). Thus, additional significant relationships with Attention components would have been expected. Most notably the 'High Distraction by Less Relevant Information and High Distractibility by External Stimuli were expected to show significant relationships with the Situations subscale.

The Behavior scale is perhaps the most difficult, and offers less information than the Situations subscale. In the Behavior scale a child must discern the character's emotion based only upon the character's behaviors (also presented in visual and oral format). This subscale was significantly positively correlated with the High Negative Valence component of the STI, without age controls, and significantly negatively correlated with the High Distractibility by External Stimuli of the Attention dimension with and without controls. Both of these relationships were expected. The scale was also significantly positively correlated with the Low Empathy and Cooperation component of the STI's Positive Emotionality dimension, indicated that children with low levels of empathy are more likely to correctly identify emotions on this ECT subtest. This relationship is particularly surprising, given the importance of understanding social cues for empathy. The Behaviors scale was significantly negatively correlated with the High Modulation of Excitability component of the Negative Emotionality dimension, another surprising relationship. This finding suggests that children with more difficulty modulating their responses perform better on the Behavior subtest. It is unclear why this relationship may have appeared.

Correlations between the CBQ and the ECT

Hypotheses were posed only about the three broad CBQ factors of Effortful Control, Extraversion/Surgency, and Negative Affect, though analyses were run on these factors and their related subscales. It was originally predicted that the Effortful Control domain would correlate positively with all ECT scales, Extraversion/Surgency would correlate positively with all ECT scales, and Negative Affect would correlate negatively with all subscales. In analyses, none of the relationships between the three CBQ broad scales and the three ECT scales were significant. Furthermore, the directionality of the relationships also failed to hold in many cases.

Given the general lack of demonstrated relationships between the broad scales of the CBQ and the ECT, it is difficult to compare the CBQ and STI as they are related to the ECT. It was expected that the CBQ and STI would show parallel relationships with the ECT and hence correlations were examined between the ECT and the specific CBQ scales. The Activity Level component of the Extraversion/Surgency factor correlated positively with the EID scale without controlling for age and gender. However, none of the parallel STI dimensions correlated with the EID. The Attentional Focusing component of the Effortful Control factor correlated significantly and positively with the Situations scale. A related STI component, High Distractibility by External Stimuli, correlated negatively, as would be expected. Finally, the Anger/Frustration component of the Negative Affect factor showed significant negative correlations with the Behaviors scale. However, the High Negative Valence scale of the STI correlated significantly and positively with this scale. It is unclear why these related components might have different relationships with the ECT scale.

Regression Analyses of the ECT

Overall, fewer of the individual components proved to be significant in regression analyses than was originally expected. Although it stands to reason that very few of the overall models explained significant amounts of the variance in the ECT, given the diverse nature of the components of which they are comprised, more was expected from individual components. Initially, it was hypothesized that most components would offer a significant contribution towards explaining the variance in the ECT scales, over and above other components in the same scale. This was by in large not shown to be the case.

In the case of the EID, only the High Negative Valence component of the STI's Negative Emotionality dimension and the High Distraction by Less Relevant Information component of the STI's Attention dimension explained significant amounts of the variance, above and beyond that explained by the rest of their respective dimensions. None of the STI overall dimension models were significant. None of the CBQ components were significant as related to the EID, nor was the overall three factor CBQ model. Although the Activity Level scale of the CBQ correlated significantly and positively with EID, it did not retain its significance in the regression analyses.

A similar pattern was evident in regressions for the Situations scale. Only the Low Intensity of Reactivity component of the Positive Emotionality dimension and the High Distractibility by External Stimuli component of the Attention dimension showed significant contributions to the variance above and beyond their dimension counterparts. These two scales also showed significant positive correlations with Situations in zero order correlations. High Cognitive and Emotional Flexibility and Low Rule Governed Behavior, both of the Self Regulation dimension, were not significant in regressions, though they were significant in zero order correlations. It seems that these scales are not

predictive of Situations outcomes when examined as part of the overall Self Regulation dimension. The Self Regulation model as a whole was not significant, nor were any of the overall models.

The CBQ three broad factor model was not significant in any of the three ECT scale regression analyses, nor were any of the single scale component models (i.e. the Extraversion/Surgency model). Within the Effortful Control factor, only the Falling Reactivity/ Soothability component remained significant in predicting scores on the Situations scale. With zero order correlations, the Attentional Focusing component of Effortful Control showed a significant relationship with Situations. However, it did not explain a significant amount of the variance above and beyond its scale counterparts in regressions.

Multiple components explained a high proportion of the variance on the Behaviors scale. The Low Empathy and Cooperation component of the Positive Emotionality dimension was significant. This dimension was also significant in bivariate correlational analyses. From the Negative Emotionality dimension, Low Externalizing, High Modulation of Excitability, and High Negative Valence components all explained significant amounts of the variance in Behaviors, above and beyond other components. High Modulation of Excitability was also significant in bivariate correlational analyses. None of the overall dimension models were significant. It is interesting that so many of the Negative Emotionality dimensions were shown to be predictors of Behaviors outcomes. It is possible that high levels of negative emotionality interfere most with one's ability to identify emotion in low context situations, as in the Behaviors scale (the most difficult ECT scale).

Only the Smiling and Laughter component of the Effortful Control CBQ factor was significant in regression analyses. The Anger/Frustration component of the Negative Affect factor was significant in bivariate correlations, but not in regressions. None of the three overall CBQ models were significant. Interestingly, although almost all of the STI's Negative Emotionality components were significant in regression analyses, none of the CBQ's Negative Affect components were significant. However, given that the STI's Negative Emotionality dimension is in part related to the CBQ's Effortful Control scale, it is possible that constructs most related to the Behaviors were subsumed under Effortful Control.

Summary and Conclusions

By in large, the relationships between scales and components of the STI, CBQ, and ECT emerged as was predicted. Although the components of STI dimensions reorganized in principal components analyses, groups of items hung together as was originally expected. New scales offered further clarification for the definition of the three temperament dimensions, suggesting that the STI is on track towards providing clear, non-overlapping definitions of subfacets of temperament.

Results of within and between dimension correlational analyses of the STI generally matched that which was predicted. In cases where relationships did not reach significance, accurate directionality was evident. A larger sample size might have helped these relationships reach significance. A notable exception exists in the Cognitive and Emotional Flexibility component of Self-regulation, which showed few expected relationships with other components. This component, which blends two constructs that are traditionally separated in definitions of self-regulation, may need further refinement.

The comparison between the STI and CBQ showed mixed results. While several of the correlations between the STI and CBQ emerged as expected, many did not. Most notably, none of the Positive Emotionality components correlated significantly with the Extraversion/Surgency scale of the CBQ. Given that the STI and CBQ in many ways measure similar constructs, stronger relationships between the two were expected.

Similarly, fewer significant relationships than expected between the STI and ECT came to light, though several were present. The relationships between the Attention dimension and the ECT seemed to be especially sparse. With this said, there were several significant correlations that emerged as was predicted. Surprisingly, there were no significant relationships between the three broad factors of the CBQ and the ECT scales.

As in the case of correlational analyses, more significant relationships between the STI and ECT exist than between the CBQ and ECT in regression analyses. With that said, it was expected that even more components of the STI would offer unique contributions to the ECT than were apparent in these analyses. Attention components offered significant contributions to both the EID and Situations scales of the ECT, indicating their importance in emotion understanding abilities in young children. Components related to either Positive Emotionality or Negative Emotionality offered significant contributions to the variance in all three ECT scales, again suggesting that these constructs are particularly important in explaining emotion understanding abilities. Finally, all but one component of the Negative Emotionality scale accounted for a significant amount of the variance in the ECT Behaviors scale, indicating the particular importance of this constructs to understanding behaviors. Overall, it appears that the STI

is a better predictor of ECT outcomes than the CBQ. Additionally, the relationship between the STI and CBQ remains cloudy.

Chapter 6: Limitations and Conclusions

Limitations

Certain limitations are implicit in the study, the first being potential differences between participating families as compared to other families within the school as well as on regional, national, and global levels. Because this study utilized a relatively heterogeneous, middle to high SES population, the populations to which it generalizes are limited to similar groups.

The use of an unvalidated measure of emotional understanding could also have been problematic. Though few issues were anticipated, as the assessment was largely inspired by pre-existing measures, the study ran the risk of utilizing an instrument that may later be proven ineffective. The study used a downward extension of Shultz et al.'s Assessment of Children's Emotion Skills (ACES) (2004). This measure has been not been validated for a preschool population. The use of the Structured Temperament Interview posed similar concerns, thought preliminary principal components analysis as well as comparisons to validated temperament measures such as the Child Behavior Questionnaire aided in confirming the validity of the STI (also see Teglasi, et al, 2009).

Concerns also arise in that intelligence influences a host of issues, and research around attention and emotion understanding specifically has suggested that children with higher levels of intelligence perform better than their less intelligent peers, regardless of attentional concerns. Unfortunately, it was controlled for in this study, though a limited measure of vocabulary was given to all participants as part of a broader study.

Finally, it should be noted that given the small sample size the study was unable to analyze possible differences in mother versus father temperament ratings as they may influence the relationship with emotion understanding. Given differences in the contexts in which parents see their children, and subsequently possible differences in perceptions of temperament, it is possible that mother and father ratings may impact proposed relationships differently. However, it should be noted that the majority of informants in prior research studies were mothers. The sample size also had an impact on the overall weight of the findings.

Conclusions and Future Directions

The research presented here is some of the first of its kind and begins to fill the current gaps in the literature. Whereas studies have emphasized the contributions of temperament and emotion competence (and thereby emotion understanding) to social competence, these two constructs have yet to be systematically examined as they impact one another. The research that does exist regarding these two constructs often utilizes unclear and incomplete definitions, calling the validity of findings into question. The current study examined the joint and unique contributions of the temperamental factors as they related to three scales of emotion understanding, utilizing specific, complete definitions of emotion understanding and of temperament.

Given the results of these analyses, additional work is needed to assess the validity of the STI, specifically the utility of its components and dimensions. An item level factor analysis of the STI dimension is warranted. Additionally, future studies may examine how the valence of ECT responses, rather than just a correct or incorrect response, is influenced by temperamental variables. The data utilized here was taken

from a larger study, which collected measures of social competence, attention, intelligence (in the form of vocabulary knowledge), and other variables. It may be useful to relate both the STI and ECT to these variables, to better establish their relationship to a broader number of constructs.

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