ABSTRACT

Title of Thesis: THE EMOTION COMPREHENSTION TEST: SELECTED PSYCHOMETRIC PROPTERTIES OF A NEW MEASURE OF EMOTION UNDERSTANDING FOR PRESCHOOLERS

Emily Anne Gustafson, Master of Arts, 2009

Directed By: Professor Hedwig Teglasi, Department of Counseling and Personnel Services

This study examines the psychometric properties, including internal consistency and item difficulty of a new measure of emotion understanding through quantitative analysis. Intercorrelations between the three subtest of the measure, correlations with age and gender, and response patterns were also examined. Emotion understanding is the ability to identify the emotions of others from facial expressions and behaviors and to understand what emotions are likely to be elicited by common social situations. Emotion understanding begins to emerge in the preschool years and serves as the foundation for social competence. The Emotion Comprehension Test (ECT) is a new measure of emotion understanding for preschoolers, which uses photographs of real children to depict natural emotional facial expressions to assess emotion identification. The measure also uses puppets to act out social situations associated with common emotions and behaviors associated with emotions. Internal consistency of the three subtests were found to be r = .699 for the Emotion Identification subtest, r = .805 for the Emotion – Situations subtest, and r = .614 for the Emotion – Behaviors subtest.

THE EMOTION COMPREHENSTION TEST: SELECTED PSYCHOMETRIC PROPTERTIES OF A NEW MEASURE OF EMOTION UNDERSTANDING FOR PRESCHOOLERS

by

Emily Gustafson

Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Master of Arts
2009

Advisory Committee:
Dr. Hedwig Teglasi, Chair
Dr. William Strein
Dr. Kathryn Wentzel

Table of Contents

List of Tables

Chapter 1: Introduction

Emotion Understanding

Research in emotional intelligence (EI) and the related construct, emotion understanding (EU), is a relatively new and fast growing field (MacCumm, Matthews, Zeidner, & Roberts, 2004). While the field has not yet adopted a standard definition of emotional intelligence, most agree that it includes recognizing others' emotions, understanding one's own emotions, and being effective in using emotion information (Geher & Renstrom, 2004).

There are two main conceptualizations of emotional intelligence. The first is characterized as a Trait or Mixed-Model approach. This is often defined as non-cognitive personal characteristics (or traits) that are beneficial to adaptive functioning. This conceptualization of emotional intelligence is often called the "Mixed-Model" approach because it is thought to be a mix of abilities, personality traits, moods, and motivational factors. This model is sometimes criticized as representing mostly personality traits along with some social-emotional abilities. Furthermore, why particular characteristics or traits were selected for inclusion while others were not remains unclear, raising questions about the models' theoretical underpinnings (Mayor, Salovey, & Caruso, 2008).

The second model is known as Ability emotional intelligence. This includes the ability to perceive, understand, use, and manage emotions (Day, 2004). As Mayer et al. (2008) conceive of emotional intelligence, it includes "the ability to engage in sophisticated information processing about one's own and other's emotions and the

ability to use this information as a guide to thinking and behavior. That is, individuals high in EI pay attention to, use, understand, and manage emotions, and use these skills to function adaptively that potentially benefit themselves and others" (p. 503). This model assumes that emotional intelligence is driven by one's underlying ability instead of being substantially reflective of personality characteristics and that one's ability increases with age and experience, similar to other forms of intelligence (Day, 2004).

There are, however, temperamental or dispositional influences on how one uses and applies any underlying ability, including one's emotional intelligence "abilities" (Teglasi, 2006). For example, natural tendencies towards high levels of attention will enhance one's ability to apply aspects of emotional intelligence at the appropriate times. If a child has problems attending to social cues, he or she will more likely have difficulties knowing when is appropriate to use emotional intelligence "ability." Research supports clear links between temperament and aspects of emotional understanding (Blair, Denham, Kochanoff, & Whipple, 2004; Denham et al., 2003).

Therefore, assessing one's ability instead of one's dispositional characteristics will, yield a more valid understanding of that person's underlying capacity of emotional intelligence. Researchers have argued that, not only is, the Ability model of emotional intelligence more theoretically sound than the Mixed trait model, but that it also does a better job at assessing the ability. As Mayer et al. (2008) argue, there are "powerful theoretical reasons why only such a clearly focused, ability-based approach can best measure EI. … Intelligences most generally are defined as mental abilities, and measuring mental abilities involves asking test takers relevant questions and then evaluating their answering against a criterion of correctness" (p. 507). The question does

remain, however, if there can truly be one criterion of correctness for all emotional evaluations; how a child reacts to a given situation may vary somewhat due to temperamental influences, sometimes resulting in multiple possible correct answers.

While the Ability model is more widely used in adult research and is the framework from which the proposed research is conducted, studies of children tend to focus on constructs that are related to emotional intelligence but that do not necessarily include all dimensions. These abilities are thought to be lower level, foundational skills (Mayer et al., 2008). Two of the four parts of Ability emotional intelligence, the ability to perceive and to understand emotions, are commonly used in child research (Hall, Geher, & Brackett, 2004). These parts make up emotion understanding and will be the focus of the current study. They are thought to be a prerequisite of the other two components of using and managing emotions effectively. These two more advanced abilities are often referred to as emotional regulation or emotional competence (Denham et al, 2003; Colwell & Hart, 2006). Emotional competence is an established predictor of social and behavioral outcomes (Fine, Mostow, Trentascosta, & Izard, 2006). Emotion understanding is important, in part, because it is considered the foundation of social competence (Shultz, Izard, & Bear, 2004; Denham, et al., 2003). The ways in which individuals generate, perceive, and regulate emotions impede or enhance growth and adaptation (Mayer & Salovey, 1995).

Measurement Techniques. Measurement techniques are of pivotal concern in assessing the two components of emotional intelligence discussed in this study, which includes the ability to perceive and to understand emotions (the components comprising emotion understanding). A construct as abstract as emotion understanding has reduced

utility if it cannot be measured properly. Mixed model approaches are more likely to draw on attributes such as self-assessed self-esteem or optimism ratings. This technique is more likely to be measured by self-report while the Ability model is usually assessed through performance tasks. Such self-report techniques (ones necessitated by the conceptualization of the construct) lead to major difficulties in measurement validity. Self-reports, for example, are naturally biased as they are seen through our own internal filters. This could be particularly important in the measurement of EI since skewed emotional perceptions would not be picked up, leading to subjectively tainted data. Research has further shown that self-reports (or other-reports) of the traits theoretically making up EI in the mixed-model conceptualization are not highly correlated to abilities such as emotion understanding as measured with a performance task and constructs thought to be highly correlated with emotion understanding such as emotion regulation (Mayer et al., 2008).

Using the Ability conceptualization of emotion understanding allows researchers to use performance measures to assess the constructs. However, since emotion understanding is a multifaceted and difficult to observe construct, a standard method of performance measurement has yet to be determined. Furthermore, as Halberstadt and Park (2007) note, "the children who are… recognizing emotions are themselves dynamic systems who are often changing in response to their own goals, beliefs, and the many changes in their ecological settings. Thus, emotion researchers are studying a changing phenomenon within a changing system" (p. 402). The techniques chosen for measurement are crucial to achieving all types of validity. Important issues in measurement include construct validity, content validity, convergent validity,

discriminant validity, and criterion validity (Geher & Renstrom, 2004). Furthermore, choices in measurement techniques create measurement outcomes that limit or expand the scope of questions that can be answered. It is, therefore, important that research questions should direct measurement and not vice versa (Halberstadt & Parker, 2007).

An additional potential difficulty in measuring emotion understanding in a young child (the focus of the current study) is how well children are able to differentiate between their own emotional reactions and how others might potentially react in a given situation. A study by Gnepp, McKee, and Domanic (1987) suggests that children as young as four years of age understand that almost everyone feels the same way in unequivocal situations (such as "child drops and breaks favorite toy) but that individual differences influence one's reaction to equivocal situations (such as "child is approached by a small dog while playing"). This understanding of the influence of individual differences and understanding that others' reactions may be different than one's own increases with age. These age differences were more pronounced in understanding that an individual might experience simultaneous positive and negative feelings in an unequivocal situation. These results suggest that even young children are able to consider how another might feel instead of simply basing answers on their own viewpoint.

A New Measure. Emotion understanding is an emerging study of research with many possible questions and corresponding measurement techniques. As such, there is still much room within the field to explore new measurement strategies. While a range of measures have been used by various researchers, there is no gold standard in assessing

emotion understanding for young children and, as Mayer et al. (2008) state, "new measures can incrementally increase conceptual clarity and understanding within a new field" (p. 510). Currently, studies vary in their method of assessing emotion understanding. The purpose of this study is to examine the psychometric properties of a newly developed test of emotion understanding for preschoolers, the Emotion Comprehension Test (ECT) (described more fully in Chapter Three), and make recommendations for possible test refinement based on these results. The test follows the Ability model conceptualization of emotional intelligence and, more specifically, assesses the two dimensions thought to make up emotion understanding: the perception (identification) of emotional expressions and the understanding of emotional situations. Measuring these specific abilities is argued to be a valid approach in measuring more narrow facets of emotional intelligence, such as those components comprising emotion understanding (Mayer et al., 2008). The new test was developed by a research team, with the author of the proposed study as lead developer. Examining the measurement techniques used in the literature summarized in Chapter Two will help clarify how other researchers in the field are measuring the construct. Many of these techniques influenced the format of this measure.

The Target Age Group. The ECT is an emotion understanding test specifically for pre-school aged children (3-6 years of age). Emotion understanding is a multifaceted construct, many elements of which are evident by pre-school age. Among these are emotion recognition based on facial expressions, linking situation and context, linking behavior and emotions, and understanding causes of emotions (Dunn & Hughes, 1998). Between the ages of two and four children learn to label emotions accurately and begin to

understand that certain situations are linked to certain emotions (Denham, 1998; Harris, 1989). Children tend to first understand happy situations, and then sad, angry, and fearful situations (Bosacki & Moore, 2004). Young children can start to make links between context and emotion. They use this understanding of situations to help themselves better understand emotions and create explanations (Bosacki & Moore, 2004). Preschoolers are capable of understanding causes of emotions among both themselves and others (Dunn & Hughes, 1998).

Related Constructs

Social Competence. Emotion understanding has been linked to many other important constructs. The most widely cited of these is the link between emotion understanding and social competence. Social competencies are regulatory tools that aim to meet situational demands and general social expectations (Rothbart & Bates, 1998). In order to behave with social competence and act appropriately in a given situation, knowledge of situational demands, social expectations for those situations and other's emotions are necessary. Therefore, emotion understanding is viewed as a pre-requisite for social competence and the related skill of self-regulation (Denham et al., 2002; Eisenberg et al., 2005). Furthermore, emotion understanding is also positively related to teacher ratings of social skills and has been found to positively relate to social skills and peer popularity, all indicators of social competence (Cassidy, Werner, Rourke, and Zubernis, 2003).

Rose-Krasnor (1997) proposed a model of social competence. Her "prism" model includes three levels of social competence in a hierarchical format. The top level is the

theoretical level, which is defined as "effectiveness in interaction" (119). The next level is the *index level*, including indicators of functioning in social interactions associated with social competence such as "qualities of interaction sequences, relationships, group status, and social self-efficacy" (119). The final level is the *skills level*, "which includes the social, emotional and cognitive abilities and motivations associated with social competence" (119) and are characteristics of the individual instead of being dependent on social relations. The *skill level* provides the building blocks for social interactions of all types and includes specific skills such as perspective taking which aligns with the Ability Model of emotional intelligence. Furthermore, this level includes goals, motivations or other dispositional characteristics. Therefore, even though there are specific abilities associated with emotion understanding encompassed in the model, other factors also influence a child's ultimate social competence. As Rose-Krasnor (1997) notes, "when behavioral skills and motivations work smoothly and effectively together, the child is more likely to attain success in the social competence measures represented at the Index Level" (123).

Academic Outcomes and Classroom Behavior. Emotion understanding can also have an impact on academic outcomes. As noted, emotion understanding leads to emotion regulation (in particular, attention regulation, and planning skills). This, in turn, has a direct impact on academic readiness and competencies (Eisenberg, Sadovsky, & Spinrad, 2005). Children who are less competent are more likely to be disruptive or aggressive and, as a result, can be more difficult to instruct (i.e., less time on task, less feedback possible) (Denham, Blair, Schmidt, & DeMulder, 2002; Raver, 2004). Those with poor emotion regulation skills are also less likely to benefit from cooperative peer

experiences and thus lose potential opportunities for growth. Furthermore, having fewer rewarding school experiences negatively affects academic motivation (Raver, 2004). Studies have also linked positive emotion regulation to higher reading and math scores (National Institute of Child Health and Human Development Early Childcare Research Network, 2003; Hill & Craft, 2003).

Verbal abilities also have been correlated with emotion understanding (Cassidy et al., 2003; Cutting & Dunn, 1999; De Rosnay & Harris, 2002). For example, Eisenberg et al. (2005) postulate that language abilities likely enhance both emotion understanding and emotion regulation, stating that, "language skills provide important tools for understanding and regulating children's emotions. Young children use language as a means to influence their environment. Specifically, children may use language in agentic self-managing talk, to communicate about social interactions, or to learn about appropriate ways to manage emotions" (110). They also note that, "children who are better able to communicate with others have more opportunity to learn about mental states, including emotion" (p. 113). Furthermore, they hypothesize that language skills are likely to have an even greater effect on emotion understanding at young ages (particularly the first 2-3 years but continuing through preschool and early elementary school) when emotion related language skills are still emerging. However, while language may influence emotion understanding, and visa versa, they are not synonymous, each representing a separate but related construct. For example, even with language abilities partialed out, emotion understanding maintains correlations to related constructs, such as theory of mind (Cutting & Dunn, 1999).

Temperament. Emotion understanding is, as previously discussed, also related to temperamental dimensions. Temperament is defined as "constitutionally based individual differences in emotional reactivity and self-regulation" (Rothbart & Scheese, 2007). Teglasi (2006) delineates the dimensions of temperament as activity, emotionality, approach-avoidance/sociability, and attention/distractibility. Characteristics of "difficult" temperaments include negative emotional reactivity, high activity, or low task orientation (low persistence and high distractibility). This temperamental makeup may "elicit responses that further disorganize behavior and disrupt higher order thinking" (Teglasi, 2006, p. 332). This feedback response can start in infancy (Teglasi, 2006). In this way, temperamental characteristics may both directly and indirectly influence one's level of emotional understanding. Previous studies have demonstrated a link between temperament and social-emotional functioning (Blair, Denham, Kochanoff, & Whipple, 2004; Denham et al., 2003). For example, soothable preschoolers (those with "easy" temperaments) are more likely to display socially competent behavior (Blair et al., 2004).

How emotion understanding interacts with these and other constructs is of the utmost importance in how researchers conceptualize emotion understanding. In Chapter Two, we will examine how researchers in the field are conceptualizing emotion understanding and the resulting impact on measurement techniques and data analysis.

The ECT fits well within Rose-Krasnor's (1997) conceptualization of social competence, assessing facets of emotion understanding that are thought to be the building blocks for further emotional development: emotion identification and affective

perspective taking. These two facets of emotion understanding, as described in this model can be considered related skills. However, while emotion identification and different kinds of affective perspective taking (i.e. presented with situational versus behavioral cues) are expected to be related, they may or may not reflect a unitary trait. If these two facets are a unitary trait measures of the two skills will be highly correlated and have many overlapping qualities, reflecting a common construct. If the skills are simply that, discrete skills but not a unitary construct, they will be more moderately correlated. However, each skill will still contribute toward one's overall emotion understanding. The ECT is designed to assess individual differences between children in their level of emotion understanding, and may eventually prove useful in flagging children with deficits. The ECT should serve these purposes well regardless of whether emotion understanding is a unitary construct or related but separate skills.

The Research Questions

The coming chapters will detail the conceptualization and measurement techniques of emotion understanding by other researchers, the strengths and weaknesses of this previous research, and the development of the ECT. The overall research question addresses what the psychometric properties of the ECT are. This question will be addressed by examining the following sub-questions: What is the internal consistency (reliability) of each of the three components of the ECT? Are the three subtests of the ECT intercorrelated? What are the response patterns within and across the ECT subtests? Do these psychometric properties or patterns vary when examined across age groups? What is the ECT's relationship to gender? Are there any recommendations for scale

revisions based on the above findings? The specifics of data analysis to this end will be further detailed in Chapter 3.

Chapter Two: Overview of the Literature

To better understand the current state of research and possible future directions this review considers the following questions: How do researchers understand and define the construct of emotion understanding? How do researchers conceptualize emotion understanding in relation to other constructs? What measurement techniques do they use to assess emotion understanding and related factors in young children? The discussion of research findings from the studies is focused less on the particular results of the studies than the conceptualizations and methods of the research.

Twenty-one studies on emotion understanding in early childhood were reviewed. A summary of types of studies reviewed and the constructs that each study examines in relation to emotion understanding (the conceptual framework) can be found in Table 2 in Appendix 2. How each study defined emotion understanding can be found in Table 1 in Appendix 1 and a summary of the measurement techniques used in each study can be found in Table 3 in Appendix 3. All studies were correlational in design. A third of these studies were also longitudinal (Denham, Couchound & Zoller, 1994; Denham et al., 2002; Denham et al., 2003; Fine, Izard, & Trentacosta, 2006; Izard et al., 2001; Raikes & Thompson, 2006; Trentacosta, Izard, ,Fine, & Mostow, 2006). A total of 1,860 children ranging in age from 2.3 to 9 were used as subjects in the 22 studies examined; studies varied between N=42 and N=263. One study also included a comparison group of college age students (Flavell et al., 2001).

Definitions of Emotion Understanding

Although emotion understanding was not always the single focus of the articles reviewed, each article did discuss the meaning of the construct in some way. A summary of these definitions can be found in Table 1: Emotion Understanding (EU) Defined in Appendix 1. The majority of the studies provided some sort of definition of emotion understanding (Cassidy, et al., 2003; Denham et al., 2002; Fabes, Eisenberg, Michealieu, & Nyman, 1991; Fine et al., 2006; Martin & Green, 2005; Pears & Fisher, 2005; Smith & Walden, 1998; Trentacosta et al., 2006; Weimer & Guajardo, 2005). These definitions ranged from those defined by the components making up the construct to contextual understandings based within the meaning of another construct.

Emotion Understanding Directly Defined. Many of the researchers provided a definition of emotion understanding that involved affect recognition based on situational cues (Cassidy, Werner, Rourke, & Zubernis, 2003; Fine et al., 2006) or facial cues in addition to situational cues (Fabes et al., 1991; Smith & Walden, 1998). For example, Cassidy et al. (2003) define emotion understanding as "the ability to understand another's emotional state based on a given situation in the world, perhaps better described as emotional sensitivity" (p. 199). Some researchers were more specific in the components comprising the construct. Denham et al. (2002), for example, include recognizing key emotional expressions, remembering emotions associated with particular social situations, and, for young children, the beginning understanding of personalized causes of emotion. Defining the construct slightly differently, Trentacosta et al. (2006) include understanding functions and activators of emotions as well as understanding display rules of emotion. Pears & Fisher (2005) include identification of facial expressions,

production of recognizable facial affect, understanding emotional expressions, and responding appropriately to others' affective expressions. More generally, Ontai & Thompson (2002) simply define emotion understanding as insight into one's own and other's emotions.

All of these definitions fit into the Ability conceptualization of emotional intelligence, representing the lower level fundamental skills that comprise facets of emotional intelligence – specifically, emotion understanding. They also fit into Rose-Krasnor's (1997) *skill level* in her prism model of social competence discussed earlier in that they are characteristics of the individual and are independent of a direct social relationship.

A "Stepping-Stone." Other researchers define emotion understanding, or emotion knowledge, from a higher conceptual level. They see it as the stepping-stone or foundation for the development of other higher level skills such as social development (Fabes et al., 1991), social competence (Fine et al., 2006; Trentacosta et al., 2006), and emotional competence (Fabes et al., 1991; Trentacosta et al., 2006). As such, these definitions fit with Rose Krasnor's (1997) *index level* since they are generally indicators of social functioning. Trentacosta et al. (2006) view emotion knowledge as a predictor of attentional competence and social and behavioral outcomes noting that emotion knowledge "forms the foundation for effective emotion utilization and social adaptation" (151). For some researchers, this was a supplemental conceptualization, but others presented conceptualizations only at this level and did not discuss the more concrete definitions of emotion understanding. Izard et al. (2001) define these more complex social and emotional skills as emotional intelligence. Like these other researchers, Izard

et al. consider emotion knowledge to be a stepping stone in acquiring emotional intelligence, noting that emotion knowledge "provides the foundation for emotion communication and social relationships" (p. 18). Coming from a slightly different perspective in defining the construct, De Rosnay & Harris (2002) focus on how an individual's internal working model of relationships leads to the encoding of affective information, seeing attachment relationships as a stepping stone on the way to achieving emotion understanding.

A Component of Emotional Competence. A major focus of many of the articles reviewed was the relation of emotion understanding to emotional competence (Camras, Fries, Perlman, & Pollak, 2006; Colwell & Hart, 2006; Denam et al., 2003; Lindsey & Colwell, 2003; Trentacosta et al., 2006). While some researchers first define emotion understanding, others assume readers' knowledge of the construct and merely discuss it in relation to emotional competence. Most of these researchers focused on how emotion understanding contributes to emotional competence. As Denham et al. (2003) note, emotion understanding is a "key component of young children's emotional competence" (p. 239). Generally, researchers think of emotion understanding as one of several contributors to emotion competence. For example, Trentacosta et al. (2006) believe that emotional competence is comprised of emotion understanding, emotion regulation, and empathetic capacity, as well as coping mechanisms for distressing emotions. Similarly, Denham et al. (2003) believe emotional competence is composed of emotion expressiveness, emotion understanding, and emotion regulation.

A Component of Social Development and Social Cognition. Many researchers also discuss emotion understanding in the context of social development and/or social

cognition (Cutting & Dunn, 1999; Denham et al., 2002; Dehham et al., 2003; Ontai & Thompson, 2002; Raikes & Thompson, 2006; Weimer & Guajardo, 2005). Emotion understanding is considered a critical component in social development (Denham et al., 2003, Ontai & Thompson, 2002; Raikes & Thompson, 2006). As Denham et al. (2002) note, "indices of early childhood emotion knowledge are conceptualized as the database which fuels all the steps of successful information processing during preschool, allowing for the regulation of affective interchange and sustained positive engagement with peers" (p. 903).

Emotion understanding is also considered to be an important part of the related construct of social cognition. Emotion understanding is important to social cognition, in part, because young children often rely on their emotion understanding when navigating social interactions (Denham et al., 1994). To hold accurate social cognitions, it is thought that a combination of emotion understanding and false understanding, one's ability to understand that another person may believe information you know to be inaccurate because they lack this information, is necessary (Cutting & Dunn, 1999; Weimer & Guajardo, 2005). However, as Cutting & Dunn (1999) write, "social cognition is not a unitary concept, and … , in particular, understanding of false belief and understanding of emotion should be viewed as related but distinct aspects of social cognition" (p.861).

A Component of Theory of Mind. Many of the articles reviewed also defined emotion understanding in part by its contribution to one's understanding of theory of mind. Theory of mind is defined as a child's understanding of the mental world (Flavell et al., 2001). If a child has a good understanding of theory of mind he or she understands that others may have differing perspectives, desires, beliefs (Pears & Fisher, 2005), is

able to attribute emotions to others based on this information (Cassidy et al., 2003), and understands the links between thoughts and feelings (Flavell et al., 2001). Several researchers define emotion understanding only in the context of theory of mind (Flavell et al., 2001; Racine, Carpendale, & Turnbull, 2007). However, emotion understanding and theory of mind are thought to be related but distinct aspects of social cognition (Cassidy et al., 2003; Pears & Fisher, 2005), meaning children likely start to gain emotion understanding before they have fully developed theory of mind.

Conceptual Framework

Few studies examine emotion understanding in isolation. Generally, they can be divided into two categories. One type of study looks primarily at emotion understanding as a predictor of factors such as current or future social competence. The other type focuses on what contributes to the development of emotion understanding. While many research questions focus on what emotion understanding predicts, there are fewer studies examining how emotion understanding is developed. Table 2: Emotion Understanding (EU) Conceptualization (Appendix 1) provides a summary of each study's general conceptual framework along with the correlational strength between variables.

Factors Emotion Understanding Predicts. One of the most common conceptual frameworks used in the literature is emotion understanding as a predictor or precursor of other factors. Since all studies were correlational in design, this proposed causal direction is a hypothesis, rather than a confirmed causal direction. This framework was used by about a fourth of the studies reviewed (Cassidy, Werner, Rourke, & Zubernis, 2003; Denham et al., 2003; Denham et al., 2002; Izard et al., 2001; Smith & Walden,

1998; Trentacosta et al., 2006). Within this framework, studies focused heavily on how emotion understanding relates to social competence or prosocial behavior (Cassidy et al., 2003; Dehham et al., 2003; Izard et al., 2001; Smith & Walden, 1998). The studies generally found that emotion understanding and social competence were indeed positively correlated. This finding fits with current conceptualizations of social competence such as the framework by Rose-Krasnor (1997) discussed previously and how the authors generally defined social competence. As one researcher concluded, "indices of early childhood emotion knowledge are conceptualized as the database which fuels all steps of successful social information processing during preschool, allowing for the regulation of affective interchange and sustained positive engagement with peers" (Denham et al., 2002, 903). Some of these studies looked at more specific facets of social competence such as prosocial behavior (Cassidy et al., 2003), aggressive behavior (Denham et al., 2002), and social problem solving strategies (Smith & Walden, 1998).

Factors Facilitating Development of Emotion Understanding. These studies investigated extensively the factors that contribute to, or hinder the development of, emotion understanding. Like the other conceptualization, this causal view represents a hypothesis based on correlation instead of a proven causal direction. Several of the studies reviewed that focused on factors which emotion understanding predicts also secondarily examined factors that helped predict the development of emotion understanding (Denham et al., 2003; Izard et al., 2001). The majority of the studies did, however, have a major focus through this second conceptual framework (Camras, Perlman, Fries, & Pollak, 2006; Colwell & Hart, 2006; Cutting & Dunn, 1999; Denham, Zoller, & Couchoud, 1994; De Rosnay & Harris, 2002; Fabes, Eisenberg, Nyman, &

Michealieu, 1991; Fine et al., 2006; Flavell, Flavell & Green, 2001; Lindsey & Colwell, 2003; Martin & Green, 2005; Ontai & Thompson, 2002; Pears & Fisher, 2005; Racine, Carpendale, & Turnbull, 2007; Raikes & Thompson, 2006; Smith & Walden, 1998). Some of these studies focused on interactive environmental factors such as interaction styles of mother-child dyads or the effects of social interactions increasing with age (interpersonal characteristics). How children engage with their environment affects how they understand their environment and their growth in emotion understanding. Other studies focused on child characteristics, such as verbal ability, behavior control, emotionality and other temperamental contributions to emotion understanding (intrapersonal characteristics). Overall, researchers found that the majority of these factors are significantly correlated with emotion understanding.

Correlation not causation. While most of the studies conceptual frameworks do appear to be based on sound theoretical reasoning, the fact remains that all of the studies reviewed are correlational in nature. Most studies assess emotion understanding and various other factors the researchers believe will be related in some way. These factors are categorized as simply related to emotion understanding, or the researcher speculates that there is a causal direction; emotion understanding predicts the factor versus the factor aids in the development of emotion understanding.

Related factors. Many of the studies also included factors that were not framed as either predicting or being predictive of emotion understanding, but have a potential impact on emotion understanding all the same. These factors include gender, age, and verbal ability. These variables were often used as control variables, since they are likely to affect emotion understanding. For example, Trentacosta et al. (2006) found that

emotion understanding was positively related to attentional competence while controlling for factors such as age, gender, and verbal ability. Accounting for these factors is important since these factors may otherwise confound results. If an increase in age is a natural elevator of emotion understanding, than the predictive powers of emotion understanding on other outcomes may be obscured if age is not taken into account.

A few of the studies examined possible gender differences (Denham et al., 2002; Fabes et al., 1991; Izard et al., 2001; Lindsey & Colwell, 2003; Martin & Green, 2005; Ontai & Thompson, 2002; Trentacosta et al., 2006), but only a few studies found significant correlations between gender and emotion understanding (Denham et al., 2002; Ontai & Thompson, 2002). The effects of gender on emotion understanding at preschool ages appear to be minimal.

Several of the studies also included age as a variable (Cassidy et al., 2003; Colwell & Hart, 2006; Faves et al., 1991; Fine et al., 2006; Flavell et al., 2001). Age was mostly used as a framework for expected developmental levels. For example, all of the studies used age appropriate measures (such as vignettes acted out with puppets). Overall, while many noted age as a possible factor, most did not look at this specifically other than to perhaps note that emotion understanding increases with age. There are few studies focusing mainly on the capacities for emotional understanding among children at various ages. This may, in part, be because age and language are already established predictors in the field.

A couple of studies did, however, look specifically at age to help understand developmental trajectories in emotion understanding. This focus provides useful information about how a skill or understanding develops – not just when it develops. Two

of these studies viewed growing older as a natural means to increased opportunity for social interactions and experiences. These experiences then lead to the development of emotion understanding (Fabes et al., 1991; Smith & Walden, 1998). In a similar vein, a measure by Fine et al. (2006) used age as an indicator of developmental trajectories. The study was longitudinal, with samples over three time frames, making age a pimary focus of the study. For example, Fine et al. (2006) concluded that "the best predictor of initial status and growth for situation knowledge of these emotions was within-individual variability across time, or the normative developmental process, rather than in between-individual differences" (p. 746). A study by Smith & Walden (1998) found that both age and cognitive-language skills contribute to emotion understanding but that age is the more consistent contributor.

Some researchers were able to draw fairly elaborate conclusions about developmental trajectories that have important implications for the types of emotion situations presented in measures are appropriate for different developmental levels. Fabes et al. (1991) and Flavell et al. (2001) both found that attributing emotion to an external event is more common in young children but that they tend to use more internal attributions as they grew older. Flavell et al. (2001) divides this development into three stages. The first stage encompassed understanding that external happenings cause emotions (even young preschoolers are aware of this). In the second stage, children learn that recalling an event can lead to a mood change (understand causal connection between thoughts and emotions). In the final stage, thoughts with no event precursor (spontaneous, internal origin) can trigger and/or accompany emotions. Such understandings of developmental trajectories, since it is commonly acknowledged that

emotion understanding increases with age (Geher & Restrom, 2004), have major implications for measurement across age groups.

Many researchers also examined verbal ability (as assessed by various receptive and expressive vocabulary tests) in relation to emotion understanding. Researchers found positive correlations between the two constructs (Cassidy et al., 2003; Colwell & Hart, 2006; Cutting & Dunn 1999; De Rosnay et al., 2002; Izard et al., 2001; Martin & Green, 2005; Raikes & Thompson, 2006; Trentacosta et al., 2006). The studies often partialed out the effects of verbal ability on their other analysis and usually found that correlations between emotion understanding and whatever construct they were examining remained. For example, De Rosnay et al. (2002) found that correlations with maternal attachment remained above and beyond verbal ability, as did Cutting & Dunn (1999) in their correlation analysis between emotion understanding with theory of mind.

Measurement Issues

Measurement of abstract constructs is always a challenge as they cannot be observed directly. Therefore, choosing appropriate assessment techniques based on the constructs in question is of utmost importance. As might be expected, the measures chosen by each researcher were driven by their research conceptualization and research questions. Every study, reviewed included at least one measure of a facet of emotion understanding. A summary of the measurement techniques used in each study can be found in Table 3: Emotion Understanding (EU) Measurement (Appendix 3).

Since emotion understanding is not an easily observable construct, an exact method of measurement is not clear. Most studies examining emotion understanding

look at two aspects: a child's emotion identification capacity and his or her affective perspective taking ability. These are two the main contributors to the emotion understanding component of Ability emotional intelligence (MacCann et al., 2004). There are many ways to measure each of these facets of emotion understanding as well as the various related factors.

There is no universally accepted measure serving as the gold standard in assessing emotion understanding. However, there are components that are common across most of the studies. There is one measure in particular, however that was used by many of the studies (Cassidy et al., 2003; Cutting & Dunn, 1999; Denham et al., 1994; Denham et al., 2002; Denham et al., 2003; Martin & Green, 2005; Ontai & Thompson, 2002; Raikes & Thompson, 2006), although several researchers adapted the measure in some way (Colwell & Hart, 2006; Lindsey & Colwell, 2003; Pears & Fisher, 2005; Racine et al., 2007). This measure was originally used in a study by Denham et al. (1986). Denham, in conjunction with various other researchers, has done much work assessing emotion understanding. The Denham et al. (1986) measure involves both affective perspective taking and emotion identification components. The measure uses line drawings for both sections and vignettes acted out by puppets during the affective perspective taking section. These methods will be explored further in the sections to follow.

Affective Perspective Taking. Affective perspective taking (otherwise called emotion situation knowledge) is the "ability to take the viewpoint of another to identify the emotion a person would feel in a given situation" (Colwell & Hart, 2006, 592). However, it is possible that in affective perspective taking tasks children report, not what they imagine another child would feel but imagine how they, themselves, might feel.

Affective perspective taking was the most commonly measured construct across all of the studies. All but one study included some affective perspective taking measure. Regardless if it is actually measuring how a child thinks another would feel or if they are merely stating what they imagine they would feel themselves, affective perspective taking is thought to be a vital skill component in emotion understanding. It has also shown to predict social competence and, therefore, remains in keeping with common theoretical models which view emotion understanding as a building stone for social competence and social functioning (Rose-Krasnor, 1997). Based on the articles reviewed, there are several different ways researchers do measure affective perspective taking ability, ranging from various forms of vignettes to child observations/interviews. Only one study did not assess this facet of emotion understanding (Izard et al., 2001).

The majority of studies followed a similar format for assessing affective perspective taking. The most common way was through vignettes (Camras et al., 2006; Cassidy et al., 2003; Colwell & Hart, 2006; Cutting & Dunn, 1999; Denham et al., 1994; Denham et al., 2002; Denham et al., 2003; Lidsey & Colwell, 2003; Martin & Green, 2005; Ontai & Thompson, 2002; Pears & Fisher, 2005; Fine et al., 2006; Flavell et al., 2001; Racine et al., 2007; Raikes & Thompson, 2006; Smith & Walden, 1998; Trentacosta et al., 2006). The studies ranged from using three (De Rosnay & Harris, 2002; Flavell et al., 2001) to 40 vignettes (Smith & Walden, 1998). By depicting a situation in a vignette format, the children are being asked to draw upon their own experiences and imagine how they would feel if a certain event transpired. All of the studies, whether they used three or 40, vignettes found that this type of measure correlated with other factors. When considering factors that are expected to be directly

linked to emotion understanding (such as social competence), the presence of positive correlations serves as an indicator of criterion validity for using affective perspective taking as an accurate measure of emotion understanding.

In scoring these vignettes, some researchers simply differentiated between correct and incorrect answers. Others, however, awarded 2 points for the correct answer, 1 point for the correct valence but the incorrect answer, and 0 points for the incorrect answer and incorrect valence (Cutting & Dunn 1999; Denham et al., 1994; Ontai & Thompson, 2002; Fine et al., 2006; Raikes & Thompson, 2006). Two studies used a similar format but awarded 3 points for the correct answer, 2 points for the correct valence but the incorrect answer, and 1 point for the incorrect answer and incorrect valence (Colwell & Hart, 2006; Lindsay & Colwell; 2003). Valence is the characterization of an emotional tone. For example, a happy emotion is positively valenced while sad and mad emotions are negatively valenced. Adding this third scoring criterion of incorrect answer but correct valence allows for a greater nuances in the scoring and could potentially allow researchers more insight into the types of errors a child was making.

The studies did vary slightly in how they used vignette measures. All but one of the studies using the Denham et al. (1986) measure or a measure adapted from it, as well as several other researchers using different measures, used puppets to deliver their vignettes to make the scenarios more engaging and accessible to their young audiences (Cassidy et al., 2003; Cutting & Dunn, 1999; Denham et al., 1994; Denham et al., 2002; Denham et al., 2003; Martin & Green, 2005; Ontai & Thompson, 2002; Pears & Fisher, 2005; Raikes & Thompson, 2006). Use of puppets can help facilitate comprehension of

the scenarios by making the stories more concrete. This method may also have aided in keeping the attention of young participants.

Some studies also used emotion expression cues, which may have helped children connect the emotions elicited by the stories to a physical reaction. Many of the studies used line drawings of emotional expressions to accompany the vignettes (Colwell & Hart, 2006; Cutting & Dunn, 1999; Denham et al., 1994; Denham et al., 2002; Denham et al., 2003; Lidsey & Colwell, 2003; Martin & Green, 2005; Ontai & Thompson, 2002; Pears & Fisher, 2005; Racine et al., 2007; Smith & Walden, 1998; Weimer & Guajardo; 2005). The line drawings from the Denham et al. (1986) measure use drawn emotions on felt faces that can be attached to the puppets used. Children in all of the studies utilizing such drawings were able to select the emotion picture they felt went with the vignette. One study used photos instead of line drawings. The children pointed to the photo that corresponded with the emotion they thought was correct instead of responding verbally (Camras et al., 2006).

Several studies also used pictures, which corresponded with the events of the stories to serve as cues or reminders (Camras et al., 2006; Cassidy et al., 2003; Racine et al., 2007). The use of event pictures used in these studies might also be useful in aiding young children's memories of described events. However, the exact utility of these additional aids is still unknown.

Several studies went beyond having cues that served as possible correct choices or event reminders, including visual or auditory cues for the correct emotion being displayed in the vignettes. In one study, the examiner used vocal tones and facial cues that corresponded to the emotion being elicited in the vignette they were acting out with

puppets (Cutting & Dunn, 1999; Denham et al., 1994; Denham et al., 2002; Deham et al., 2003; Martin & Green, 2005; Ontai & Thompson, 2002; Pears & Fisher, 2005; Raikes & Thompson, 2006). The final format of emotion cue utilized was in the form of video (De Rosnay & Harris; 2002).

Most of the vignettes presented stories of an emotionally stimulating situation. The investigator would then ask the child to identify the emotion that would most likely be expressed by the character in the vignette (Cassidy et al., 2003; Colwell & Hart, 2006; Denham et al., 2003; Denham et al., 2002; Fine et al., 2006; Smith & Walden et al., 1998; Trentacosta et al., 2006). For example, in a study by Colwell & Hart (2006), the child was presented with 13 one-sentence stories about a character. The child was asked if the character would feel happy, sad, angry, or afraid (the four emotions assessed across all studies using vignettes) based on the story. While this procedure was common, this was one of the few studies that allowed the child to either verbally respond or identify the emotion using a line drawing. Most studies only asked for a verbal response and many also used puppets to act out the vignette.

The range of emotion options used in Colwell & Hart (2006) was the most common across the studies although a few did assess more. A study by Fine et al. (2006) assessed some additional emotions with an overall list including joy, interest, anger, shame, fear, and sadness. One study also included ambiguous and neutral emotional expressions (Trentacosta et al., 2006).

The study by Flavell et al. (2001), using only three vignettes, focused exclusively on emotional states invoked by internal thoughts instead of external situations. The participants were asked to either identify what could have prompted a feeling change

when there were no external factors. The researchers found that the ability of participants to correctly make this determination was largely a factor of age. Young children, under the age of five, often had great difficulties with this task often citing reasons for emotions such as the character hitting her head to elicit the sad emotion when this event did not take place in the story.

The studies following the Denham et al. (1986) format also assessed if children were able to identify the correct emotion in the vignette when it was a non-stereotypical emotional reaction for that particular child in a similar situation. The child's parent filled out a pre-assessment questionnaire indicating how their child would react to various situations. When the vignettes were presented to the child, the puppet was presented as feeling opposite of how the child would feel in that situation (based on the parent report). This part of the examination assessed whether children can separate out their own feelings and objectively identify emotional reactions of others. This form of vignette has some potential drawbacks. Requiring parental involvement and individual adaptations for each assessment complicate the evaluation process. False parental perceptions could also interfere with the validity of this measurement technique.

One study also assessed if the child could correctly determine an emotion even when it was inconsistent with certain facts of the vignette or emotional expression shown by a puppet. A study by Cassidy et al. (2003) included vignettes in which the character has both a visually apparent and a conflicting, but hidden, real emotion. The child is presented with 8 vignettes through puppets and accompanying pictures depicting each scene. The stories contained situations that resulted in both typical and atypical (unexpected) emotions. The child is asked to choose the appropriate facial expression

(happy, sad, angry, or afraid) for the puppet affect given the facts of the story. The children were asked to state how the character really felt and how they appeared on the outside. This part of the measure was ultimately not used in analysis as it was uncorrelated with all other measures. This lack of correlation indicates that distinguishing between the appearance and the reality of emotion is not a good contributor to emotion understanding at this young age. The more straightforward approaches yielded better results.

De Rosnay & Harris (2002) used a somewhat different approach than the other studies, presenting their vignettes via three short videos. The video depicted a child being left alone by his or her mother and having three visible emotional reactions to three separate events. The children were given more than just a description of events or puppet show depiction, as is usually the case with vignettes. They saw the events of the scene as well as the emotional reaction of the child before they were asked how the child might feel.

Two studies also used some supplemental measures of emotion understanding. Denham et al. (2003) used a measure to assess understanding of mixed emotions. The child was read stories about a character feeling two emotions (often of opposite valence) and then to identify how the character felt. The second additional measure assessed display rules in which a child had to identify how a character in a story felt about concealing one's emotions and what emotional expression was on the character's face. These are more developmentally advanced skills and, as such, the researchers found them to be barely emerging in kindergarten. Such a measure could perhaps be important in detecting subtleties in older children but is beyond the understanding of young children

and, therefore, unhelpful for preschool or kindergarten populations.

Denham et al. (1994) measured children's understanding of the causes of emotion. Children were shown a puppet with a felt emotion face and asked why the puppet might feel the emotion show on their face. They were scored based on the number of accurate reasons someone might feel a particular emotion.

Weimer & Guajardo (2005) used a somewhat different format than most of the other studies to assess affective perspective taking; they were one of the few studies that did not use vignettes. Instead, they presented each child with picture emotion cards depicting happy, sad, mad, and scared affective states. The children then identified the emotions. If they were inaccurate, they were corrected and were able to try again until they had correctly identified all emotions. Once they had accomplished this, the examiner asked each child to give examples of what makes the child, a friend, the child's mother and father feel each of the four emotions, using the emotion pictures from the emotion identification task as prompts. The quality of their responses was scored on a four point scale. While this measure assesses if a child is coming up with potential reasons for an emotional reaction, it does not assess how well a child is able to understand other's reactions to events witnessed or find out what kind of situations they may or may not have emotion schemas established for.

A study by Fabes et al. (1991) used one measure that diverged markedly from the rest in format. Instead of using vignettes, they used an observer/interview method in which children's affective perspective taking ability was assessed in real life contexts. An observer rotated through areas of a preschool at five-minute intervals. While they were at an area with three or more children they waited for one of them to show an overt

emotional reaction. After recording the reaction, its intensity, and its cause, the observer would pull aside the closest child that was not involved in provoking the reaction. The child was asked how the other child felt and why he or she felt that way. They found that children were significantly more likely to accurately identify positive than negative emotions. The researcher noted that "in naturalistic settings the available cues regarding others' emotional states are likely to be great in quantity and variety, and more transient in nature than they are in experimentally controlled settings" (Fabes et al., 1991, p. 858). Furthermore, in a real life interaction, the observable situation will be accompanied by a visual representation (emotional expression and other body language) of the emotion experienced. The vignettes, on the other hand, often did not provide this aid of emotional expression, even though this is one of the foundations for emotion understanding. However, research in a naturalistic setting also provides many challenges. The situation presented cannot be controlled for extraneous variables that could have an impact on the measurement. This measure also likely has limited utility for more common clinical or school use.

Overall, researchers found the Affective Perspective taking measures to be positively correlated with measures of social competence such as teacher rating and observation (Cassidy et al., 2003; Denham, et al., 2003). A longitudinal study with a main focus on social competence found that emotion understanding contributed to social competence both concurrently (preschool) and at kindergarten (Denham et al., 2003). This type of task is widely accepted in the field as a useful tool for assessing emotion understanding. Its general correspondence with related factors gives further credence to its utility as a measurement tool.

Emotion Identification. The emotion identification component is also considered an important part of emotion understanding by many researchers but was not included in many studies. As one research team noted, "together, emotion identification and affective perspective-taking encompass the facets of emotion understanding that are closely related to children's social competence" (Colwell & Hart, 2006, 592). Fifteen of the 21 studies reviewed included a measure of emotion identification. The rationale for omitting such a measure was not included by any of the researchers. However, if affective perspective taking is already predictive of other factors, perhaps researchers viewed the additional measure of emotion identification as unnecessary.

Emotion identification usually involves a task using drawn pictures or photographs depicting an emotion that the child being assessed must identify. Emotion identification was assessed in over half of the studies. While the measurement procedure for emotion understanding was fairly similar across the studies, there were a couple of major differences. The first was the use of photographs versus line drawings of emotional expressions. Techniques ranged from using photographs (Izard et al., 2001; Trentacosta et al., 2006), photographs on the computer (Camras et al., 2006), line drawings (Cutting & Dunn, 1999; Denham et al., 1994; Denham et al., 2002; Martin & Green, 2005; Ontai & Thompson, 2002; Pears & Fisher, 2005; Racine et al., 2007; Raikes & Thompson, 2006; Smith & Walden, 1998), or photographs and line drawings (Colwell & Hart, 2006; Lindsey & Colwell, 2003). For the most part, those studies following the Denham et al. (1986) technique used line drawings during their assessments. Weimer & Guarado (2005) simply described their measure as using "emotion cards," leaving unspecified if the cards use drawings or photographs.

While no researchers discussed any justification for using line drawings versus photographs, there may be some potential advantages to one over the other. Line drawings are simplified depictions of emotional expressions and, as such, may provide an uncomplicated and straightforward assessment method. However, they may also be measuring a taught skill rather than a child's understanding of a genuine and more complex emotional expression, as could be more directly assessed by photographs. Using photographs guarantees that human emotion identification rather than representational expressions of emotion identification are measured.

An example of the general method used in this kind of assessment is seen in a study by Colwell & Hart (2006). They presented a child with a photograph of someone exhibiting a happy, sad, angry, or afraid expression. The child was asked to verbally identify the emotion depicted out of those four choices. In this study, this procedure was repeated using line drawings of the same emotions. The researchers did not discuss if the different administrative techniques yielded different results. Other studies used similar methods but used only line drawings or photographs. Weimer & Guarado (2005) used a similar technique but used it as emotion identification training for the subjects prior to the affect perspective taking task instead of as an assessment.

The last variation on this technique was to present the children with several drawings of different emotions and ask them to point to the drawing corresponding with the emotion stated by the researcher (Camras et al., 2006). This technique represents receptive emotion identification knowledge as opposed to expressive emotion identification knowledge, such as that assessed in the Colwell & Hart (2006) study. Some studies used both techniques (Cassidy et al., 2003; Cutting & Dunn, 1999; Denham

et al., 1994; Denham et al., 2002; Denham et al., 2003; Izard et al., 2001; Lindsey & Colwell, 2003; Martin & Green, 2005; Ontai & Thompson, 2002; Pears & Fisher, 2005; Racine et al., 2007; Raikes & Thompson, 2006).

The second major difference was the number of emotions subjects were asked to identify. The majority of studies only examined the four most basic emotional expressions (happy, sad, mad, scared). This choice of emotions was likely guided by developmental trajectories in young children's emotion understanding. Some studies used more emotions such as one by Izard et al. (2001), which included photographs depicting interest, joy, surprise, sadness, anger, disgust, contempt, shame, and fear. Those studies that did use more emotions indeed found that children struggled with the less commonly used emotions such as interest or shame. However, it is possible that including these additional emotions could help eliminate potential ceiling affects of the more constricted measures.

Social competence. More variety was found in some of the measurement techniques of other constructs used across the studies. These differences were largely driven by the research questions being investigated. Some of the more common types of measures included indicators of social competence. Overall, over half of the studies assessed this construct. To measure social competence researchers used teacher ratings (Colwell& Hart, 2006; Denham et al., 2002; Izard et al., 2001), both teacher and peer ratings (Cassidy et al., 2003; Denham et al., 2003), both parent and teacher ratings (Weimer & Guajardo, 2005), or all three (Lindsey & Codwell, 2003). Both studies that used peer rating used ratings of likability when presented with a photo of peers. To assess teacher views of social competence of students, the studies typically used rating

scales that assess frequency of various behaviors. A variety of behaviors were assessed across the studies including socially competent and adaptive behaviors (Cassidy et al., 2003), peer behavior, aggressive behaviors, social behavior (Colwell & Hart, 2006), anxious-withdrawn behavior, and sensitive-cooperative behavior (Denham et al., 2003).

One study examined the relationship between observation, teacher ratings, and peer ratings. They found significant correlations between teacher ratings and observations of social skills. This indicates that teachers are accurate raters of social skills in classroom. They were also able to conclude that children do rate peers that are more socially competent and behave in more prosocial ways as more likable (Cassidy et al. 2003). These findings indicate that all three methods for assessing social competence have good content validity.

Verbal ability. The other most commonly used measure of other constructs was a vocabulary test. Over half of the measures also assessed the sample's verbal ability (Cassidy et al., 2003; Colwell & Hart, 2006; Cutting & Dunn, 1999; Denham et al., 1994; De Rosnay and Harris, 2002; Fine et al., 2006; Izard et al., 2001; Martin & Green, 2005; Pears & Fisher, 2005; Raikes &Thompson, 2006; Smith & Walden, 1998; Trentacosta et al., 2006). Except for Denham et al. (1994), they all did this using published vocabulary tests. Denham et al. (1994) used an overall estimate based on observation of the child and a maternal report of expressive language ability. The most commonly used test was measure of receptive vocabulary, The Peabody Picture Vocabulary Test (Colwell & Hart, 2006; Fine et al., 2006; Izard et al., 2001; Martin & Green, 2005; Raikes & Thompson, 2006; Smith & Walden et al., 1998). The studies found mixed results as to the relationship between emotion understanding and verbal ability. However, most found at

least some positive correlations. Many studies found verbal ability to be positively correlated with measures of emotion understanding (Cassidy et al., 2003; Cutting & Dunn; 1999; Denham et al., 1994; De Rosnay & Harris, 2002; Izard et al., 2001; Martin & Green; 2005; Pears & Fisher, 2005; Raikes & Thompson, 2006; Trentacosta et al., 2006). A study by Fine et al. (2006) found that verbal ability was not predictive of emotion situation knowledge, overall. They did, however, find that verbal ability does predict growth in situation knowledge of shame.

Studies that controlled for verbal ability still found significant correlations between emotion understanding and other factors. Izard et al. (2001) found that emotion understanding remained a significant predictor of outcomes even when verbal ability was controlled for. This indicates that measures of emotion understanding are assessing the target construct instead of some other mental abilities, which is suggestive of good discriminant validity. Vocabulary may help facilitate emotion understanding but it is not synonymous with it. For example, Fine et al. (2006) found that verbal ability was only predictive of emotion understanding of shame because "of the higher levels of sophistication required to garner knowledge of the self-conscious emotion of shame across time. Children with higher verbal ability may be more able to absorb the concept of shame and apply it to their understanding of emotion-eliciting situations at a faster rate than children whose language ability is not as developed" (p. 747). Other studies failed to discuss the effect of verbal ability on the other measures (Colwell & Hart, 2006).

Observation. Two studies used observation as the primary means of collecting their data. A study by Fabes et al. (1991) used an observation/interview technique during free play to assess emotion situation knowledge. Other observational methods included

reactions to others emotions during free play (Denham et al., 2003; Denham et al., 2002), emotional displays during freeplay (Denham et al., 2002; Fabes et al., 1991), and child-peer interactions during free play (Lindsey & Colwell, 2003). One study assessed prosocial behavior with peers through observation. The researchers found this technique to be effective since teacher ratings had strong positive correlation with the Behavior Observation scores (Cassidy et al., 2003). Several studies also used observation to determine aspects of the mother-child relationship. They were able to determine that the quality of relationship is correlated with emotion understanding (Colwell & Hart, 2006). Many studies used observation to assess parent-child emotion talk (Denham et al., 1994; Martin & Green, 2005; Ontai & Thompson, 2002; Racine et al., 2007; Raikes & Thompson, 2006)

Other Measures. Other measures varied widely and were largely driven by the researchers' conceptualizations of emotion understanding and what other factors they believe it is related to. Measures mostly focused on child characteristics and ranged from parental assessed temperament (Fine et al., 2006; Izard et al., 2001), mind understanding (Cassidy et al., 2003; Pears & Fisher, 2005), false belief understanding (Cutting & Dunn, 1999; Racine et al., 2007; Weimer & Guajardo, 2005), coping behavior (Denham et al., 2003), attachment security (De Rosnay & Harris, 2002; Ontai & Thompson, 2002; Raikes & Thompson, 2006), and social problem-solving strategies (Smith & Walden, 1998). One study used a peer-nominated emotional expressiveness assessment and found that emotion understanding was negatively related to anger expressiveness (Trentacosta et al., 2006). Some measures examined factors outside of the child such as mother depression (Raikes & Thompson, 2006)

Overall Conclusions

Overall, the current review was useful in considering the initial research questions presented. An examination of the reviewed studies revealed that emotion understanding in young children is understood fairly consistently by researchers across the field. There are two basic conceptualizations of emotion understanding that are based primarily on causal predictions. Most of the research questions focused on specific dimensions within this framework. The review also highlights some major similarities and differences across measurement techniques. However, most studies lacked psychometric data on the measures used, making it difficult to assess their true utility. Much work is still needed on the measurement issues.

As emotion understanding is still a relatively new field of research, many important questions still remain. While the review was able to shed some light on the current state of the field, it also indicates that there is room for much growth in the field in both examining measurement techniques and exploring additional related factors. Moving toward more definitive measurement techniques is an important step. More normative information and psychometric properties are needed for the measures currently in use. The field needs to continue exploration and development of measurement techniques. Establishing tests with known and sound psychometric properties is an important contribution to the growing field of emotion understanding.

The aim of the current project is to contribute to this particular area of need. The proposed research will explore a new measurement technique and investigate the psychometric properties of this newly developed measure. The development of the new

measure was guided by many of the techniques used in past studies. Some of the strongest features of previously used emotion understanding measures were selected in developing the Emotion Comprehension Test. This will be further discussed in Chapter Three under the Measure Development section.

While the aim of the current project is limited to the scope of improving measurement techniques in the arena of emotion understanding, there are other weak areas of research on emotion understanding that became apparent through the course of conducting this review. There is a clear need for more information on what contributes to emotion understanding. Since emotion understanding is so important for social competence, as many of these studies have shown, it is important to know how to intervene to improve emotion understanding and, therefore, social competence and social functioning. Without knowing some of the more specific mechanisms facilitating its growth, this will remain a difficult task.

Continuing to explore factors that emotion understanding predicts is also an important future direction. Results are just starting to emerge in this area and indicate that emotion understanding has an impact on many important childhood outcomes. There is also indication that temperamental factors and emotion understanding are linked. More research on these potentially reciprocal interactions is needed.

A major weakness in the field is the lack of causal studies. While researchers have drawn many causal type inferences from correlation data, such practices cannot tell us definitive causal directions. More longitudinal, quasi-experimental, and experimental studies are needed in order to move causal directions beyond the speculative stage. A priori hypotheses should be formed to ensure conservative estimates of causal relations.

Future studies should also strive to include a more diverse population base. One study specifically looked at African-American children (Smith & Walden, 1998) and one examined children from low socio economic backgrounds (Cutting & Dunn, 1999) but most look at a middle-class white population. If social interactions have an influence on emotion understanding, as some of the studies have indicated, the population base could have an effect on results. For example, researchers found fear to be more prevalent in the African-American population than other populations. They speculated that this was due to environmental influence and the more common occurrence of fearful events in many of the participants' lives.

Overall, research in the field of emotion understanding in children has shown much growth over the past 20 years. Many useful measurement techniques and conceptualizations have emerged from the research thus far. The challenge is now to further refine measurement techniques in order to support more sophisticated and revealing research. The newly developed measure being evaluated in this project is essentially a refinement of techniques used by other researchers. The best aspects of currently used measures were pulled on in its creation and will be discussed in greater detail below.

Chapter Three: Research Method of Design of the Study

Summary of Purpose

The main purpose of the proposed study is to describe the development and characteristics and examine the psychometric properties of a newly designed measure of emotion understanding, the Emotion Comprehension Test (ECT).

Design

The study will focus solely on the quantitative information produced by the ECT administration. The data is part of a larger correlational study. However, since the ECT is the only measure examined for this study, procedural explanations will be limited to those involving the planning, administering, and analyzing of the ECT.

Participants

The participants are children, ages 3 years and 1 month to 6 years and 9 months (Mean = 4.684, Standard Deviation = .896), who mainly attended the Center for Young Children (CYC) at the University of Maryland, College Park. A small number of the participants (n = 4) attended a local private school. The children comprise an ethnically diverse but largely middle class sample and come from families that are connected in some capacity to the university. Data was collected for 84 or 81 children depending on the subtest.

Instrument Development: A New Measure of Emotion Understanding

Creating a new measure is only a worthwhile task if it is filling a gap in measurement instruments or making improvements over pre-existing measures. As seen in the review, many researchers have attempted to create measurement techniques in emotion understanding. However, none proved to be an ideal measure in assessing emotion understanding in young children. The measure developed for this project combines the best elements from several studies, and like many of the other measures, represents a highly structured performance measure of emotion understanding. To address the limitations of the existing emotion understanding measures for preschool aged children, we developed a new instrument, the ECT and the aim of this study is to investigate its psychometric properties.

The ECT was developed in the spring of 2007 by building on the strengths of two related measures: the Affect Knowledge Test (Denham, 1986) designed for preschool children and the Assessment of Children's Emotion Skills (ACES) (Schultz et al., 2004), designed for children in kindergarten and older (used in Trentacosta et al., 2006, reviewed in the above section).

Many of the measures used in the articles reviewed were from Denham's The Affect Knowledge Test (1986). This test is, however, potentially flawed in fairly significant ways. The measure uses drawn pictures of emotions instead of pictures of real people expressing emotions. This technique is potentially problematic. Children may be able to identify a drawn smiley face because they have been taught this identification task explicitly but not actually be able to link this emotional knowledge to genuine expressions of emotion. Furthermore, in the test's situational emotion identification

section, some of the scenarios were confusing and could easily represent several emotions despite only one correct answer being allowed. One example is: Nancy/Johnny: "I am going to go ride my Big Wheel. Where is it? Someone took it! It's gone! Someone stole it!" This situation is supposed to elicit a sad emotion, however, it could also elicit anger or sadness. Many of the scenarios are similarly ambiguous. The test also contains a rather complicated section in which a parent questionnaire is necessary to determine the child's "non-stereotypical" response. It relies on parent perception too heavily and is overly complicated. The format requires the tester to custom make a part of the test for each child based on the parental answers to the questionnaire. This additional step may prove overly cumbersome to many clinicians or teachers potentially interested in a measure of emotion understanding.

However, there are some positive aspects of The Affect Knowledge Test. The test has high internal consistency levels (Affect Labeling, r = .89; Affective Perspective Taking, r= .93; Aggregate of the two (affective aggregate), r = .95). Other strengths include the use of both an emotion identification section and an affect recognition task assessed through vignettes. Another positive aspect is the use of puppets in vignette presentation in order to better engage young children and help make the vignettes more easily accessible. These aspects are shared by other tests in the field, and we drew on them for the ECT. In developing the ECT, we combined some of these positive aspects with a straightforward measure of emotion understanding that is aimed at slightly older children.

The structure of the ECT mirrors that of the ACES measure, which is used by Trentacosta et al. (2006) (see appendix C: Table 3 Emotion Understanding (EU)

Measurement). This test, which is designed for older children than the ECT and the Affect Knowledge Test and was used with first and second graders in this study, has slightly lower internal consistency than the Affect Knowledge Test (Emotion Attribution Accuracy which includes situations, behaviors, and ID, r= .68). Essentially, the ECT has used many elements of the ACES measure to create an adapted downward extension for preschoolers. Like the ACES, the ECT includes pictures of children expressing an emotion to be identified and uses short vignettes to assess how well children connect situations and behaviors to emotions. The test starts with an emotion identification task. In this section, children are presented with a set of pictures depicting one of 5 emotions (happy, mad, sad, scared, and neutral) and are asked to tell how the person in the picture might be feeling. The set of 26 photos include a diverse group of children (African-American, Asian, Caucasian, and Hispanic) and display a wide variety of emotions. Pictures portray happy feelings (5), angry feelings (5), scared feelings (4), sad feelings (4), and neutral feelings (3). Fifteen of these photographs are of male children and 11 are of female children.

While we did follow the ACES format in the use of photographs instead of line drawings, we replaced most of the ACES pictures, which were clearly posed, with pictures portraying more natural emotional expressions. To assess if children understand genuine emotional expressions, using non-posed emotion shots seemed essential. We collected candid photographs of young children making the various emotional expressions from friends and colleagues as well as from a photo shoot with a naturally expressive child being read stories that elicited the different emotions. In order for all children to connect with the set of photographs, we took efforts to include and even mix

of boys and girls from a variety of races. In the scared category we were unable to find enough genuine scared pictures and, therefore, with the permission of the test creators, used ACES pictures to supplement our collection. The correct answer for each picture was decided by a panel of adults and then pilot tested on a group of adults.

The next two sections of the test also parallel the ACES test. Each section has 15 vignettes. The first section includes vignettes that provide situational cues to what emotion the character might be feeling. The second section includes vignettes that provide behavioral cues to the emotion. The children are presented verbally with a short scenario and are asked how the person might be feeling (the same five emotions as in the pictures). The vignettes remain largely the same as those presented on the ACES test but adapted for younger children by altering some of the vignettes to be more appropriate for the preschool setting, simplifying some of the language and introducing dialog and the use of puppets (as did Denham, 1986). For example, we adjusted an ACES vignette where a child is sent to the principal's office. We felt a preschooler would be unlikely to understand of the significance of being sent to the principal's office. We substituted being sent to "time out" as a punishment to make it more age appropriate.

The directions for the vignettes are clear and in language appropriate for a three to six year old: "I'm going to tell you about some kids your age. I want you to tell me how they feel. Tell me if you think they would feel happy, sad, mad, or scared. Sometimes you might think they feel two feelings, like both mad and sad. If you think there is more than one feeling, tell me both (If they say two, circle both. Then follow up by asking which they think the child feels more strongly and put an asterisk by that feeling). Sometimes the child may not have any feeling, and you can tell me that by saying, "no

feeling." Don't say "no feeling" just because you're not sure how they would feel, though. If you think they would have any feeling, I want you to take a guess at what it is, okay? We will use puppets and call the children by the color of their shirt."

An example of a vignette from the Emotion – Situations subtest is as follows: "Green let Red play with Green's favorite toy. Red plays with the toy and then it breaks. Do you think Green feels happy, sad, mad, scared, or no feeling?" All vignettes in this section describe some sort of situation of event that Green is placed in. After each vignette, the child is asked to identify if Green would feel Happy, Sad, Mad, Scared, or have No Feeling. The Emotion – Behaviors subtest follows the same format with the same answer choices, differing only in the description of Green's behavior instead of the situation Green is in. For example: "Green is talking softly and green's eyes are watery. How do you think green feels happy, sad, mad, scared, or no feeling?"

The correct answer for each vignette was determined by a team of researchers and pilot tested on a group of adults. For some answers, more than one answer was thought to be appropriate. In those cases, more than one correct answer was allowed for those items, such as when the child could plausibly feel both mad and sad equally. However, if there was one clear primary emotion and a likely secondary emotion, only the primary emotion was considered as correct.

In order to determine the utility of the picture aids when identifying emotional responses to situations, we will be comparing two forms of administration. During the Situation vignettes the children are asked to identify the correct emotion verbally. In the Behavior vignettes a set of emotion photographs representing each of the emotional responses to be assessed is laid in front of the children. They are asked to both verbally

identify the correct emotion while pointing to the corresponding emotion photo. This technique was not used by either ACES or Denham et al. (1986).

We made adjustments in additional areas. Some of the ACES vignettes had a similar problem to that of the Denham et al. (1986) measure noted earlier; that the situations could often result in two emotions but only one is considered to be the correct answer. Emotional reactions to situations are often guided by temperament and individual differences. Because of this, some scenarios may legitimately make two children feel two different emotions, such as sad or mad. In correctly understanding social situations, there is room for individuality within certain parameters and the testing situation presents only an abstract version of social situations. Instead of limiting the correct answers to one choice for all of the vignettes, for a number of scenarios in the Situations and Behaviors scales we decided it was inappropriate to adopt a single correct response. This accommodation was not made for vignettes we felt could elicit both a primary and a secondary emotion. For those vignettes credit was given only for the primary emotion. We will continue to grapple with these scoring issues as we make scale refinements based on the currently proposed research project.

Furthermore, to assure the ECT had the most nuanced measurement scale possible, part of Denham's et al. (1994) scoring procedure were drawn on. This scoring procedure awards 2 points to the correct answer and the correct valence, 1 point to the correct valence, but incorrect answer, and 0 points to an answer that is both incorrect and has the wrong valence. This scoring technique was not utilized by Trentecosta et al. (2006) in their use of the ACES measure.

Finally, the ECT added an open-ended section referring to understanding the causes of emotion which is not included in the ACES measure. During this final section of the test, the examiner revisits 3 or 4 vignettes from each section of the exam with the child. The vignette is acted out for a second time and the examiner reminds the child what feeling they thought the puppet would have. The child is then asked why they think the puppet would feel that way. The aim of this section is to gain qualitative data on how each child is thinking about the cause of the puppet's emotional reaction.

Overall, the measure pulls on the best aspects of several other measures, resulting in a stronger measure, pending the investigation of its psychometric properties. To summarize the above descriptions, the ECT tests the child's ability to identify emotions, and their understanding of age appropriate situation knowledge in situations with both contextual cues and behavioral cues. The format is straightforward and relatively easy to administer. The ECT includes three subtests. The first is the Emotion Identification Test which includes 21 items and requires participants to identify the emotional expression of a photograph of a child from five answer choices. The Emotion – Situations, which emphasizes situational cues, and Emotion – Behaviors, which emphasizes behavioral cues, subtests are vignette based and each have 15 items.

These three subtests are adapted from the ACES measures with changes to the pictures used in the emotion identification section and some of the vignettes changed to better fit a preschooler's level of understanding and experience. The ECT also utilizes puppets to help engage and facilitate understanding for the young target audience, a feature influenced by The Affect Knowledge Test. The ECT utilizes a 3 point scoring system that differentiates between correct, incorrect but with correct valence, and

incorrect answers in order to increase measure sensitivity. This scoring system was also inspired by the Affect Knowledge Test. Furthermore, for scenarios where more than one emotion is an appropriate response, full credit for is awarded for both answers, allowing more flexibility for temperamental differences in reaction type, a feature original to the ECT. Finally, the ECT also provides qualitative data on certain items, allowing further exploration of children's emotional reasoning. This is also a feature original to the ECT. No other measure fully addresses all of these issues. The ECT offers an improvement in measurement technique of preschoolers to the field of emotion understanding.

We pilot tested the measure at a preschool summer camp before starting the study. We found no problems with the measure and so proceeded with the measure as it stood.

Procedure

The data are archival. Data collection followed the following procedures: first, the research staff discussed research objectives with staff at the CYC and parents at back to school night. The researchers then disseminated consent forms to parents of children in the relevant age range. Families were given multiple opportunities over the course of data collection to participate. The only basis for selection was the age of the participating child and parental permission.

Informational cover letters and informed consent forms describing the study were distributed to the parents of the participating preschoolers. Signed permission forms from parents or guardians constitute informed consent on behalf of the students although each child is given the opportunity to decline participating each time they are asked to go with the researcher.

A research team of five data collectors has each been assigned between 10 and 25 children. Each data collector was trained in the ECT to assure standard procedures. The measure is administered in one, 30-minute session with each child. If the child appears fatigued or requests to return to class before the full test has been administered, data collection for that child is finished in a second section.

All materials and data collected for the project are confidential, stored in locked file cabinets in the office of Dr. Teglasi, located at 3124 Benjamin Building in the Department of Counseling and Personnel Services. Only the people directly involved in the research have access to materials. There is a file folder for each child in which all data for that child is kept. Each child is assigned a case number, their names removed. A master sheet of names corresponding with case number is kept in a locked drawer. Data entry took place on a secure computer and each child is only identified by case number. All data was double entered for quality assurance.

Chapter 4: Results

Internal Consistency and Correlations

The internal consistency was established for each of the Emotion Comprehension Test's three subtests (Table 4). While there is no widely agreed upon alpha level to determine adequate internal consistency (Pedhazur & Schmelkin, 1991), researchers often consider Chonbach's Alpha of .700 or higher in the acceptable range, and this alpha level was used as the cut off for the acceptable range in the current study. The internal consistency of the Emotion Identification subtest (r=.699) and the Emotion – Situations subtest (r=.805) were acceptable. The Emotion – Behaviors subtest does not have adequate internal consistency (r = .614).

Table 4

Internal Consistency of ECT Subtests

	Cronbach's Alpha	Number of Items	N
Emotion Identification	.699	21	84
Emotion – Situations	.805	15	84
Emotion – Behaviors	.614	15	81

The correlations (using Pearson) between the three subtests were determined (Table 5). The Emotion Identification subscale and the Emotion – Situations subscale were significantly positively correlated (p=.395) as were the Emotion – Situations and Emotion – Behaviors subscale (p=.454). However, the Emotion Identification and

Emotion – Behaviors subscales were not significantly correlated with each other (p=.171).

Table 5

Correlations Among ECT Subtests

	Emotion Identification	Emotion – Situations
Emotion Identification		
Emotion – Situations	.395**	
Emotion – Behaviors	.171	.454**

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

The correlation between each of the subtests and age (years and months) and gender were also established (Table 6). All three subtest were significantly positively correlated with age using the Pearson correlation (Emotion Identification r = .414, Emotion – Situations r = .435), Emotion – Behaviors p=.378). The Emotion Identification subtest (r=-.231) was significantly but modestly correlated with gender using the Spearman correlation, with males (coded 1) performing slightly better than females (coded 2). Neither the Emotion – Situations (p=-.121) or the Emotion – Behaviors (p=-.070) subtests were significantly correlated with gender.

Table 6

Correlations Between ECT and Age/Gender

	Emotion Identification	Emotion – Situations	Emotion - Behaviors
Age (Years and Month)	.414**	.435**	.378**
Gender	-.231*	-.121	-.070

*p < .05. **p < .01.
Males coded as 1, Females coded as 2

Item Analysis to Improve Internal Consistency and Correlations

The Corrected Item-Total Correlation for each item and the Cronbach's Alpha if any given item was deleted were calculated (Table 7). Three items were flagged in the Emotion Identification subscale as bringing down the internal consistency of the scale. All three items had a Corrected Item-Total Correlation (Item 1 p=-.028; Item 11 p=;-.076 Item 18 p=-.037) of less than .1 and resulted in an overall higher internal consistency for that subscale when removed (Item 1 r=.726; Item 11 r=.730; Item 18 r=.727). No items in the Emotion – Situations subtest decreased internal consistency. One item in the Emotion – Behaviors subtest had a Corrected Item-Total Correlation (Item 4 r=.052) of less than one and resulted in an overall higher internal consistency for that subscale when removed (Item 4 r=.628). Each of the 4 items have been highlighted in Table 7.

Table 7

Item Level Statistics

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Emotion Identification		
Item 1	.391	.684
Item 2	.377	.685
Item 3	-.028	.726
Item 4	.355	.686
Item 5	.369	.678
Item 6	.183	.699
Item 7	.349	.684
Item 8	.285	.688
Item 9	.400	.674
Item 10	.395	.680
Item 11	-.076	.730
Item 12	.467	.667
Item 13	.386	.680
Item 14	.315	.685
Item 15	.377	.684
Item 16	.357	.680
Item 17	.413	.672
Item 18	-.037	.727
Item 19	.406	.676
Item 20	.303	.685
Item 21	.282	.689

Emotion – Situations		
Item 1	.509	.786
Item 2	.327	.802
Item 3	.575	.781
Item 4	.421	.795
Item 5	.347	.799
Item 6	.609	.782
Item 7	.523	.787
Item 8	.295	.805
Item 9	.381	.797
Item 10	.503	.787
Item 11	.358	.799
Item 12	.267	.805
Item 13	.354	.798
Item 14	.569	.784
Item 15	.340	.801
Emotion – Behaviors		
Item 1	.262	.595
Item 2	.258	.597
Item 3	.353	.576
Item 4	.052	.628
Item 5	.170	.613
Item 6	.205	.607
Item 7	.234	.599
Item 8	.136	.612
Item 9	.135	.611

Item 10	.325	.584
Item 11	.300	.591
Item 12	.278	.592
Item 13	.286	.590
Item 14	.305	.585
Item 15	.344	.578

The internal consistency of each of the three subtests and the correlations between subtests and the correlation between each subtest and gender and age were recalculated with the three items with low Corrected Item-Total Correlations removed from the Emotion Identification subtest and the one item with low Corrected Item-Total Correlations removed from the Emotions – Behavior subtest. This was performed to assess how the removal of the items affected the psychometric properties of the test, to aid in the potential scale revision decision-making process The new internal consistencies of each subtest (with the original values in parentheses) can be found in Table 8. The internal consistency of the Emotion Identification subtest (r=.803) and the Emotion – Behaviors (r=.628) improved with the items removed. The internal consistency for the Emotion – Situations subtest remained the same since no items were removed from this scale.

Table 8

Internal Consistency of ECT Subtests with Low-reliability Items Deleted

	Cronbach's Alpha	Number of Items	N
Emotion Identification	.803 (old = .699)	18	84
Emotion – Situations	.805 (old = .805)	15	84
Emotion – Behaviors	.628 (old = .614)	14	81

The new correlations between subtests (with original values in parentheses) can be found in Table 9. The correlation between Emotion Identification and Emotion – Situations subtests remained the same (p=.395) with a positive significant correlation. The correlation between the Emotion Identification and Emotion – Behaviors subtests decreased, remaining insignificant, with the items removed (p=.138). The significant correlation between Emotion – Situations and Emotion – Behaviors increased (p=.451).

Table 9

Correlations between ECT Subtests with Low-reliability Items Deleted

	Emotion Identification	Emotion – Situations
Emotion Identification	1	
Emotion – Situations	.395** (old = .395)	1
Emotion – Behaviors	.138 (old = .171)	451** (old = 454)

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

The correlations between each subtest and age (years and months) and gender with the 4 items with low Corrected Item-Total Correlations removed are presented in Table 10. The correlation between Emotion Identification and age remained significantly positively correlated (p=.379) but decreased from the original correlation. The correlation between Emotion – Situations and age remained the same since no items were removed from this subscale. The correlation between Emotion – Behaviors subtest and age remained significantly positive and increased (p=.383).

The correlation between the Emotion Identification subtest and gender decreased and became insignificantly negatively related (p=-.083). The Emotion – Situations subtest's correlation with age remained the same since no items were removed. The Correlation between the Emotion – Behaviors subtest and gender was virtually the same at p=-.073, remaining insignificantly negatively correlated.

Table 10

Correlations Between ECT and Age/Gender with Low-reliability Items Deleted

	Emotion Identification	Emotion – Situations	Emotion - Behaviors
Age (Years and Month)	.379** (old=.414)	.435** (old =.435)	.383** (old=.378)
Gender	-.083 (old=-.231)	-.121 (old=-.121)	-.073 (old=-.070)

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

The difficulty level of each item was then calculated in two ways. Difficulty level is found by dividing the number of subjects who selected the correct answer for the item by the total number of subjects for that item. Item difficulty close to 1 represents a

relatively easy question, whereas item difficulty closer to 0 represents a very difficult question. Since the ECT also records correct valence, the item difficulty was calculated two different ways, since factoring all of these variables into one calculation proved too difficult. First the item difficulty was calculated the way described above; correct versus incorrect answers with incorrect answers that had correct valence were simply counted as incorrect. Next, the item difficulty was calculated by counting as correct all answers that were either correct or were incorrect but had the correct valence. This calculation tended to lessen the item difficulty as more answers were counted as correct. However, only negatively valenced correct answers had different answers between the two calculation methods since for Happy or No Feeling items, there was no "incorrect but correct valence" option as they were the only answer of that valence. The analysis was done for the total group, and then split into an older and younger group and recalculated for each group. The group was split into older and younger age groups at the median age. The younger age group consisted of 42 children and the older group consisted of 56 children. Item difficult for Emotion Identification (Table 11), Emotion – Situations (Table 12), and Emotion – Behaviors (Table 13) are below. Items have been grouped by the emotion that corresponded with the correct answer for a given item. Happy items were the easiest across age groups while Scared and No Feeling items proved the most difficult.

Table 11

Emotion Identification Item Difficulty Level for Total Group, Younger Group, and Older Group

	Item Difficulty: Correct (valence and answer) vs Incorrect (even if correct valence given)			Item Difficulty: Correct valence (whether answer is correct or not) vs Incorrect valence		
	Total	Younger	Older	Total	Younger	Older
Happy Items:						
Item 1	.95	.91	.98	.95	.91	.98
Item 8	.90	.86	.94	.90	.86	.94
Item 10	.90	.80	.98	.90	.80	.98
Item 15	.93	.86	.96	.94	.86	.98
Item 21	.90	.91	.96	.90	.91	.96
Sad Items:						
Item 2	.90	.91	.90	.96	.94	.98
Item 6	.56	.49	.61	.70	.63	.76
Item 14	.82	.77	.86	.90	.89	.92
Item 20	.56	.49	.61	.80	.66	.90
Mad Items:						
Item 4	.87	.80	.92	.96	.94	.98
Item 7	.83	.77	.88	.94	.86	.98
Item 13	.83	.77	.88	.92	.86	.98
Item 16	.79	.66	.88	.85	.74	.92
Item 19	.68	.54	.76	.87	.80	.92
Scared Items:						
Item 5	.76	.74	.76	.81	.77	.84
Item 9	.58	.42	.69	.67	.51	.76

Item 12	.69	.54	.80	.76	.68	.82
Item 17	.68	.54	.76	.74	.66	.79
No Feeling Items:						
Item 3	.43	.37	.47	.45	.40	.49
Item 11	.39	.37	.41	.39	37	.41
Item 18	.56	.60	.53	.57	.60	.55

Table 12

Emotion – Situations Item Difficulty Level for Total Group, Younger Group, and Older Group

	Item Difficulty: Correct (valence and answer) vs Incorrect (even if correct valence given)			Item Difficulty: Correct valence (whether answer is correct or not) vs Incorrect valence		
	Total	Younger	Older	Total	Younger	Older
Happy Items:						
Item 2	.75	.57	.86	.75	.57	.86
Item 9	.83	.74	.90	.83	.74	.90
Item 15	.76	.60	.88	.76	.60	.88
Sad Items:						
Item 3	.62	.49	.71	.81	.69	.90
Item 10	.74	.60	.84	.83	.77	.88
Item 12	.75	.71	.76	.85	.80	.88
Sad/Mad Items:						
Item 1	.70	.54	.82	.74	.57	.86
Item 6	.89	.83	.94	.89	.83	.94
Sad/Scared Items:						
Item 11	.50	.43	.55	.77	.71	.82

Mad Items:						
Item 5	.25	.17	.26	.93	.89	.96
Item 7	.30	.14	.41	.82	.71	.90
Item 13	.23	.23	.22	.89	.80	.96
Scared Items:						
Item 4	.13	.06	.18	.85	.80	.89
Item 8	.38	.26	.47	.61	.49	.69
Item 14	.62	.60	.63	.92	.86	.96

Table 13

Emotion – Behavior Item Difficulty Level for Total Group, Younger Group, and Older Group

	Item Difficulty: Correct (valence and answer) vs Incorrect (even if correct valence given)			Item Difficulty: Correct valence (whether answer is correct or not) vs Incorrect valence		
	Total	Younger	Older	Total	Younger	Older
Happy Items:						
Item 5	.68	.53	.79	.68	.53	.79
Item 14	.72	.58	.81	.72	.58	.811
Happy/No Feeling Items:						
Item 8	.90	.88	.91	.90	.88	91
Sad Items:						
Item 10	.69	.50	.83	.86	.79	.89
Item 15	.60	.40	.74	.78	.66	.85
Sad/No Feeling Items:						
Item 1	.72	.70	.72	.93	.88	.96
Item 3	.60	.53	.66	.73	.68	.77

Item 13	.63	.49	.72	.81	.74	.85
Sad/Mad Items:						
Item 6	.49	.41	.55	.59	.53	.64
Sad/Mad/Scared Items:						
Item 11	.90	.85	.94	.90	.85	.94
Mad Items:						
Item 2	.26	.24	.28	.89	.88	.96
Item 9	.22	.18	.26	.93	.91	.94
Mad/No Feeling Items:						
Item 12	.59	.54	.62	.86	.80	.89
Scared Items:						
Item 4	.17	.12	.21	.46	.41	.49
Item 7	.11	.09	.13	.72	.67	.74

Next, the correlation between age and each item was calculated for the Emotion Identification subtest (Table 14). This was first calculated for the total group. The group was then divided into an older and younger group and recalculated for each group. This was repeated for the Emotion – Situations subtest (Table 15) and the Emotion – Behaviors subtest (Table 16).

Table 14

Emotion Identification Individual Item Correlation with Age

	Total Group	Younger Group	Older Group
Happy Items			
Item 1	.117	.150	-.133
Item 8	.129	.112	-.009
Item 10	.269*	.015	.097
Item 15	.206	.196	.085
Item 21	.130	.226	.043
Sad Items			
Item 2	-.007	-.105	-.026
Item 6	.255*	-.077	.394**
Item 14	.105	.177	.000
Item 20	.227*	-.124	.180
Mad Items:			
Item 4	.155	.156	-.076
Item 7	.184	.011	.111
Item 13	.240*	.124	.230
Item 16	.235*	-.005	.028
Item 19	.148	.010	-.154
Scared Items:			
Item 5	.068	.053	.006
Item 9	.302**	-.048	.201
Item 12	.187	.078	-.020
Item 17	.237*	.100	.136

No Feeling Items:			
Item 3	.156	.213	.123
Item 11	.056	.220	-.014
Item 18	-.030	.053	.014

Table 15

Emotion – Situations Individual Item Correlation with Age

	Total Group	Younger Group	Older Group
Happy Items			
Item 2	.411**	.322	.236
Item 9	.229*	.212	.075
Item 15	.386**	.342*	.212
Sad Items:			
Item 3	.277*	.331	-.006
Item 10	.304**	.127	.262
Item 12	.069	-.047	.003
Sad/Mad Items:			
Item 1	.255*	.132	-.076
Item 6	.211	.153	.128
Sad/Scared Items:			
Item 11	.065	-.045	-.106
Mad Items:			
Item 5	.122	-.052	.001
Item 7	.327**	.188	.088
Item 13	.147	.038	.086

Scared Items;			
Item 4	.248*	-.045	.241
Item 8	.127	.136	-.217
Item 14	.168	.128	.176

Table 16

Emotion – Behaviors Individual Item Correlation with Age

	Total Group	Younger Group	Older Group
Happy Items			
Item 5	.267*	.079	.089
Item 14	.191	.068	-.050
Happy/No Feeling Items:			
Item 8	.143	.404*	.090
Sad Items:			
Item 10	.312**	.061	.209
Item 15	.220*	-.108	-.036
Sad/No Feeling Items:			
Item 1	.112	.137	.077
Item 3	.154	.196	.060
Item 13	.110	.089	-.166
Sad/Mad Items:			
Item 6	.047	-.345*	-.028
Sad/Mad/Scared Items:			
Item 11	.151	.217	.000
Mad Items:			

Item 2	.149	.296	.043
Item 9	.049	-.212	.000
Mad/No Feeling Items:			
Item 12	.156	.242	.120
Scared Items:			
Item 4	.026	-.358*	-.041
Item 7	.152	.058	.176

Additional Analyses found in Appendix 4

The mean, standard deviation, and test of normality for each of the items were calculated and are presented in Table 17, located in appendix 4.

Response distributions for each item were also determined for the total group, and then split into a younger and older group and recalculated for these two groups. Some items were deemed to have more than one correct answer. Trends in the distribution reflected those found in the Item Difficulty analysis, in which happy items tended to have the most uniformly correct responses and scared and no feeling items tended to have more varied response patterns. Response distributions for Emotion Identification (Table 18), Emotion – Situations (Table 19), and Emotion – Behaviors (Table 20) subtests can be found in appendix 5. The correct answer(s) for each item is bolded.

Chapter 5: Discussion

The goal of this study was to examine the psychometric properties of the newly designed ECT measure. Below, the implications of the results for this measure are discussed. In particular, the internal consistency and correlations of the original measure are examined, followed by implications of how the item analysis can be used to improve the internal consistency and correlations by potentially eliminating certain items. Finally, the item difficulty levels, item level statistics, and limitations of the current study are discussed.

Internal Consistency and Correlations

As depicted in Table 4, the internal consistencies of the ECT Emotion Identification and Emotion – Situations subtests were acceptable. However, internal consistency of the ECT Emotion – Behaviors subtest was below but approaching the acceptable level. Chronbach's alpha of .700 or higher was considered in the acceptable range. However, there is no strictly agreed upon standard for what constitutes an appropriate alpha and a lower alpha is generally tolerated by researchers and statisticians for research purposes. Higher alphas are generally expected when using measures to assess and make decisions about individuals (Pedhazur & Schmelkin, 1991). The Emotion – Behaviors subtest has an alpha of .614 and so has an internal consistency in this case considered adequate for research purposes but would be inadequate if using the measure for decision making at the individual level.

With regard to between-subtest correlations (Table 5), the Emotion Identification and Emotion – Situations subtests were significantly positively correlated, as were the Emotion – Situations and Emotion – Behaviors subtests. Positive correlations suggest that each pair of subtests are measuring modestly to moderately related, and possibly overlapping (10-20%) elements of the same construct (emotion understanding). However, data analysis demonstrated a positive but not significant correlation between the Emotion Identification and Emotion – Behaviors subtests suggesting that they are less related than the other measures.

There are several possible implications of the low correlation between the Emotion Identification and Emotion – Behaviors subtests. First, this may indicate that the test, including all 3 subtests, is not measuring the unitary construct of emotion understanding, and that the Emotion – Behaviors subtest may be measuring something different. Second, the three subtests may be measuring related aspects of emotion understanding, instead of a unitary construct. Thirdly, the three subtests (or perhaps just one of the 3 subtests) may be measuring different constructs from each other, meaning not all are measuring emotion understanding, or the same part of emotion understanding. However, a lack of intercorrelations between all three subtests may quite plausibly also indicate that some facets of emotion understanding (such as recognition of behavioral indicators) may not emerge until an older age. Emotion understanding develops as children grow older and have an increased opportunity for social interactions and experiences (Fabes et al., 1991; Smith & Walden, 1998). Age has been the most consistent predictor of the development of various facets of emotion understanding (Cassidy et al., 2003; Denham et al, 1994; Fabes et al., 1991; Fine et al., 2006; Smith &

Walden, 1998). A longitudinal study by Fine et al. (2006) demonstrated that the best predictor for understanding situational knowledge as measured through vignettes was the normative developmental process, as opposed to individual differences.

More specifically related to the low correlation between the Emotion Identification and Emotion – Behaviors subtests, research on the developmental trajectory of emotion understanding suggests that emotion identification first emerges, followed by an understanding of external attributions to emotions, with understanding of internal attributions developing last (Bosacki & Moore, 2004; Denham, 1998; Fabes et al., 1991; Flavell et al, 2001; Harris, 1989). A study by Flavell et al. (2001) found that children under the age of five, the bulk of our sample, had great difficulty understanding emotional states invoked by internal thoughts. This developmental trajectory may also contribute to the lower internal consistency of the Emotion – Behaviors subtest.

As seen in Table 6, age was significantly correlated with all three of the subtests. This result is expected as emotion understanding is developed over time and increases with age, as noted previously (Bosacki & Moore, 2004; Denham, 1998; Harris, 1989). Between the ages of two and four children learn to label emotions accurately and begin to understand that certain situations are linked to certain emotions (Denham, 1998; Harris, 1989). The depth and breadth of a child's emotional understanding continues to deepen as they grow older and learn from their experiences (Fabes et al., 1991; Smith & Walden, 1998). External causes for emotions develop before internal causes and children also develop an understanding of different emotions as they get older. Children tend to first understand happy situations, and then sad, angry, and fearful situations (Bosacki &

Moore, 2004). If the test accurately measures this developmentally influenced construct, older children are expected to outperform younger children.

Gender, however, was only weakly correlated with the Emotion Identification subtest, and not correlated with the other two subtests. This finding is consistent with the literature reviewed previously, as gender has not consistently been found to correlate with emotion understanding. Whereas many of the studies reviewed examined the correlation between emotion understanding and gender far more found no significant result (Fabes et al., 1991; Izard et al., 2001; Lindsey & Colwell, 2003; Martin & Green, 2005; Ontai & Thompson, 2002; Trentacosta et al., 2006) than found a significant correlation (Ontai & Thompson, 2002). The Ontai & Thompson, (2002) study found that gender was related to emotion understanding in the opposite way as was found in this study. Given this contradictory finding and the relative lack of correlation between gender and emotion understanding in most studies, gender is likely not highly correlated with emotion understanding.

Item Analysis to Improve Internal Consistency and Correlations

One aim of this study was to examine if there were ways to improve the psychometric properties of the ECT. In the next section the pros and cons for keeping or eliminating items that may threaten the psychometric properties of the subtests are weighed. The Corrected Item-Total Correlations for each item in each of the subscales were examined. Three of the items in the Emotion Identification subtest and one item in the Emotion – Behaviors subtest were flagged as dragging down the potential internal consistency of the scale. A low "corrected item-total correlation" indicates that the item

may not be measuring the same thing as the rest of the scale. All three flagged items on the Emotion Identification subtest had the correct answer of No Feeling. There were no other items with No Feeling as a correct item in that subtest. Perhaps the type of answers elicited by this answer type was different than the others. Children may find these items more ambiguous than the rest of the items, resulting in a response pattern unlike that for the rest of the items. With all three of these items eliminated, the internal consistency of the Emotion Identification subtest increases, although it started out in the adequate range before these items are eliminated.

One item in the Emotion – Behaviors scale that dragged down the subscales' internal consistency had a correct answer of Scared. Other items with a correct answer of Scared did not drag down internal consistency. No clear pattern of answer types creating the affect was present for this scale. Item number 4: "It is recess and you are watching green play ball with some other kids. Green gets the ball and just stands there doing nothing, his body seems to freeze." This item had the second highest item difficulty when calculated as Correct (valence and answer) vs Incorrect (even if correct valence given) (the hardest item also had scared as the correct answer). When calculated as Correct valence (whether answer is correct or not) vs Incorrect valence this item proved the most difficult on the test. This item was significantly correlated with age among the younger half of the participants. It was not significantly correlated with age when the group was viewed as a whole or among the older participants. This item also reflects inner source of feeling. As the literature suggests understanding of internal attributions develops last and proves the most difficult for younger children (Bosacki & Moore, 2004; Denham, 1998; Fabes et al., 1991; Flavell et al, 2001; Harris, 1989). The internal

consistency of the Emotion – Behaviors scale increased with this item eliminated but still did not reach an adequate level.

However, internal consistency is not the only consideration when examining the contribution of items to a scale. The correlations between the 3 subtests were also examined with the flagged items eliminated. With the 4 items removed, the correlations between the Emotion Identification and Emotion – Situations subtests and between the Emotion – Situations and Emotion – Behaviors subtests remained virtually the same. The already insignificant correlation between the Emotion Identification and Emotion – Behaviors subtests decreased slightly. The changes in correlations between the subtests were relatively insignificant and, therefore, do not play a major role in deciding whether to eliminate the items.

The correlation of age with the subtests, on the other hand, is an important factor in determining whether to keep or eliminate the flagged items. The correlation between age and the items in the subtests is important since the test should be measuring a developmentally progressive construct. The correlation between age and the Emotion Identification subtest decreases with the three items with low "corrected item-total correlation" removed. Removing or keeping these items hinge on a compromise between internal consistency and correlation with age. Although internal consistency is important, the test without the items removed still has adequate internal consistency. The slightly lower internal consistency could even potentially result in a fuller measure of Emotion Identification since as internal consistency nears 1, the smaller the range of information the test may be gathering. Furthermore, keeping a higher correlation with age will allow the test to serve more purposes such as an aid in flagging children with delayed

development of emotion understanding. Since there are both pros and cons to keeping the flagged items in the Emotion Identification subtest, keeping the items as experimental items while further research is conducted is appropriate. This will allow for the examination of the correlation between these items and other external criteria aside from age.

The correlation between age and the Emotion – Behaviors subtest, however, serves to reinforce the elimination of item with low "corrected item-total correlation" in this subtest. The correlation between the subtest and age increases once the item is removed. This item both lowers the already inadequate internal consistency of this subtest, suggesting it may not be representative of the construct being measured, and drags down the subtest's correlation with age.

Item Difficulty Levels and Item Level Statistics

The difficulty level of each item was calculated and results indicated a variety of difficulty levels represented by the individual items. However, results generally varied based on whether difficulty level was measured as Correct (valence and answer) vs Incorrect (even if correct valence given) or as Correct valence (whether answer is correct or not) vs Incorrect valence. Those items with a high level of difficulty when answers were judged as either right or wrong but a considerably lower level of difficulty when scored as correct valence versus incorrect valence, were often bimodal in their answer distributions. Those items with the heaviest loading on one item regardless of how difficulty was scored tended to be either of low difficulty level, with most people selecting the correct answer.

According to Crocker & Algina (1986), item difficulty ideally falls between .4 and .6 to maximally discriminate between examinees. Items much below .4 may be too difficult to meaningfully differentiate between subjects. Conversely, items above .6 may be too easy to differentiate between subjects, since almost all subjects answer similarly despite actual levels of emotion understanding. Many of the items on the ECT do fall outside of the .4-.6 range. This was particularly true for the Emotion Identification subtest which had many items with item difficulty above .6. Adjusting item difficulty level on such a test may be difficult without eliminating certain emotional expressions such as happy. However, although certain emotions did not provide much variability, eliminating them would discard an important facet of emotion understanding, even if it is one that is mastered by most children by the age of 3. Furthermore, such items may be potentially useful (pending subsequent study) to flag outliers and help identify children with difficulties in the area of emotion understanding.

Furthermore, there is an exception to the rule "when the test scores will be used exclusively for decision making for examinees at the upper or lower end of the distribution" (p.324). The ECT is one such test since it may prove useful in screening for those with particular difficulties in the area in Emotion Understanding to facilitate early intervention. Flagging outliers may be a more important goal when testing social emotional skills than discriminating between examinees as often the ultimate goal of more cognitively oriented tests. The Emotion Identification subtest has the highest number of low difficulty and the fewest high difficulty items. The Emotion – Behaviors subtest proved the most difficult subtest, with the largest number of high difficulty questions. However, eliminating items that fall outside of the ideal range on a test that

can be used for screening purposes would eliminate the ability to flag children with wrong answers to very low difficulty questions.

Trends can also be seen in the level of item difficulty associated with the different emotions. Happy emotions tended to be the lowest difficulty items, followed by sad, mad, and then scared. No feeling items were the most difficult. This follows developmental trends as children learn to identify happy feelings before scared items. No feeling items may be difficult since they do not follow the sequence of easily recognizable emotions and may tend to seem more ambiguous than other items. This order of difficulty follows the trend of emotion development (first happy, the sad, angry, and fearful) in children (Bosacki & Moore, 2004). Whereas fewer than half of the items in each subtest were significantly correlated with age, almost all were correlated positively with age.

Examining the item difficulty level differences between the total sample, the younger portion of the sample, and the older portion of the sample, also provides useful information. Fitting with the developmental growth in emotion understanding, the total sample item difficulty tends to be in the middle, with the younger group having a slightly harder item difficulty and the older group having a slightly younger item difficulty. This item analysis fits with significant positive correlations found between each of the subtests and age. It also fits with developmental research suggesting that emotion understanding increases with age (Bosacki & Moore, 2004; Gnepp, McKee, & Domanic, 1987; Fabes et al., 1991; Flavell et al., 2001; Smith & Walden, 1998).

Looking more closely at individual items helps to shed some light on factors that may be influencing how participants tend to answer the question. For example, Item #4

on the Emotion – Situations test was generally very difficult for our participants. The question is seemingly straightforward: "Green is walking down the hall and sees a big kid walking toward him. Narrator demonstrates with Red puppet: "Get out of my way!" Do you think green feels happy, sad, mad, scared, or no feeling?" Most children choose sad (correct valence, incorrect answer) instead of scared (the correct answer). Children of this age may not understand the significance of this sort of physical intimidation of bullying situation yet. However, most participants understand that the puppet would be scared when it is "left in the woods" when it is getting dark as is presented in another item. Likely, this type of situation fits a "scared schema," often associated with the dark and night time. Conversely, bullies and physical intimidation may not yet have emerged in the consciousness of young children yet as either existing or being scary instead of just producing sadness.

Similarly, with question #5, also from the Emotion – Situations subtest ("Green built a big tower of blocks. Red came over and knocked them down and then laughed. Narrator demonstrates with puppets. Does Green feel happy, sad, mad, scared, or no feeling?"). Although the correct answer is mad, many participants selected sad. Likely, young children have difficulty differentiating between negatively valenced emotions when presented in situations. They may associate most negative emotions with being sad, and only some specific situations with mad.

The ECT has potential uses to both measures individual differences among preschool-aged children as well as be used as a clinical tool to flag children with difficulties in this area. Since emotion understanding is considered a precursor to many other important skills, having a tool to help identify children who struggle in this area

early could lead to early interventions around issues of emotion understanding. However, before this test is ready to serve as a tool for either purpose, much work is still necessary. Examining the factor analysis of each scale is important in scale development. Furthermore, an exploratory factor analysis examining each scale's relationship to external criteria would also be useful in the further development of this scale. Scale revisions and the repetition of the above steps with the new questions in place would likely be a necessary next step before this scale would be ready for practical application as either a test of individual differences or a flagging instrument for students struggling in the area of emotion understanding.

Limitations

Although the test development of the ECT was based on a sound theoretical framework and drew upon commonly used techniques in the field for measuring emotion understanding in young children, construct validity is not ensured. The threat of not measuring the intended construct remains, as would be the case for any newly designed test measuring an abstract construct. Examining only the test's psychometric properties will not help shed light on this question. Links between the ECT and age and gender have, however, already been examined and produce theoretically expected results. Future research on the validity of this measure is still needed to address this concern.

A second potential limitation of the study is the rather socio-economically homogenous nature of the participants. Although they are somewhat diverse ethnically, most students come from well-educated and relatively affluent families. How

generalizable the utility of the ECT as a psychometrically sound instrument for other populations will remain uncertain.

Finally, a relatively small sample size could potentially limit the findings of the proposed study. The sample may be too small to find significant correlations in some areas, potentially limiting the utility of this study. However, a sample size of 81-84 should provide sufficient power to assess most of the psychometric properties of the ECT.

Appendix 1

Table 1

Emotion Understanding (EU) Defined

Study	EU Defined
Camras (2006)	emotion competence = perception + **understanding of others' emotions** from sourcees including facial expressions
Cassidy (2003)	Emotion understanding = ability to understand another's emotional state based on given situation; Theory of mind = understanding of mind + **emotion understanding**
Colwell (2006)	Emotional competence = **emotion understanding** + affective perspective taking
Cutting (1999)	Social cognition = false belief understanding + **emotion understanding**
Denham (1994)	**Emotion understanding** = key early component of social cognition
Denham (2003)	Emotion competence = emotion expressiveness + **emotion understanding** + emotion regulation
Denham (2002)	**Emotion knowledge** = recognizing key expressions of emotion + remembering emotions associated with particular social events + beginnings of understanding personalized causes of emotion
De Rosnay (2002)	Internal working model of relationships → encoding of affective information
Fabes (1991)	**Emotion knowledge** → social development and emotional competence; Emotion understanding = ability to infer other's emotional traits
Fine (2006)	Emotion Situation Knowledge = ability to infer other's emotions from situational cues
Flavell (2001)	**Emotion knowledge** = component of emotional intelligence
Izard (2001)	**Emotion knowledge** = component of emotional intelligence; **Emotion knowledge** = foundation for emotion communication and social relationships

Table 1 continued

Emotion Understanding (EU) Defined

Study	EU Defined
Lindsey (2003)	"Affect management skills" (emotional competence) = ability to regulate own emotions + **ability to correctly ID emotional states of others + ability to discern the cause of emotions**
Martin (2005)	**Emotion understanding** = social-cognitive ability to recognize and interpret others' emotions
Ontai (2002)	**Emotion understanding** = insight into own and other's emotions; **Emotion understanding** critical to social development
Pears (2005)	**Emotion Understanding** = identification of facial expressions + producing recognizable facial affect + understanding emotional expressions + responding appropriately to others' affective expressions; Theory of mind = understanding that others may have differing perspectives, desires, beliefs.
Racine (2007)	Theory of mind = beliefs + **emotions**
Raikes (2006)	Social development = emotion identification + emotion talk (which facilitates **emotion understanding**)
Smith (1998)	**Emotion understanding** = recognize basic emotions from facial and contextual cues
Trentacosta (2006)	**Emotion knowledge** = understanding functions of emotions + activators of emotion + display rules of emotion; Emotion competence = **emotion understanding** + emotion regulation + empathetic capacity + coping mechanisms for distressing emotions
Weimer (2005)	Social cognition = **emotion understanding** (involving understanding of mental states + false belief measures (theory of mind); Theory of mind = thoughts and beliefs are representations of world

Appendix 2

Table 2

Emotion Understanding (EU) Conceptualization

Study	Age (years)	Sample Size	Study Type	Related Factors*	Factors EU Predicts*	Factors facilitating development of EU*
Camras (2006)	4-5.5	N=84	correlational	age (Expression identification task, r(82)=.26, p<.02, Emotion Situation task r(82)=.30, p=.006); adoption age (r(38)=-.45, p=.003); mother's education level (r(35)=.38, p<.03)	none	duration of institutionalized experiences (r(38)=-.47, p=.003); duration of post-institutionalized experiences (r(38)=.45, p=.001); adopted versus not adopted (not adopted outpreformed adopted); country adopted from (Chinese outpreformed Eastern European)
Cassidy (2003)	3-5.4, M=4.3	N=67	correlational	age (r=.54, p<.001); verbal ability (r=.53, p<.001)	prosocial behavior (r=.27, p<.10); teacher rated social skills (r=.32, p<.01), peer populariy (no significant differences: r=.09)	none
Colwell (2006)	preschool, M=3.5	N=61	correlational	age (r=.59, p<.01), teacher-rated social behavior (no positive correlations), vocab (r=.40, p<.01)	none	mother mildly positive emotional framing (r=.25, p<.05); mother mildly negative emotion framing (r=.27, p<.05); mother-child relationship quality (synchrony) (r=.28, p<.05)

Table 2 continued

Emotion Understanding (EU) Conceptualization

Study	Age (years)	Sample Size	Study Type	Related Factors*	Factors EU Predicts*	Factors facilitating development of EU*
Cutting (1999)	3.5-4.8, M=4.16	N=128	correlational	age (affective perspective taking significant contributor), false believe understanding (affective perspective taking r=.44, p<.01; affective labeling r=.39, p<.01), language abilities (BPVS) (affective perspective taking r=.45, p<.01; affective labeling r=.38, p<.01), gender (no significant differences)	none	family background: Mother education (affective perspective taking r=.41, p<.01; affective labeling r=.38, p<.01); Mother ocupation class (affective perspective taking r=.30, p<.01; affective labeling r=.26, p<.01); Father education (affective labeling r=.31, p<.01); father occupation class (affective perspective taking r=.30, p<.01; affective labeling r=.34, p<.01); Family structure (affective perspective taking r=.22, p<.01)
Denham (1994)	M=3.4	N=47	longitudinal	age (β at entry=.248, p<.05; R=.417, p<.05; R^2=.174, p<.05)	none	maternal emotion socialization (negative responsiveness r=-.269, p<.05; positive responsiveness r=.434, p<.001; maternal emotion language r=.379, p<.001; maternal anger R=.775, p<.001; R^2=.600, p<.001), cognitive-language abilities (r=.303, p<.05)
Denham (2003)	3-4, M=3.8	N=143	correlational, longitudinal	emotion regulation (analysis shows it predicts social competence- did not address relation to emotion knowledge), age (emotion knowledge bigger influence on social competence when younger)	social competence (emotion knowledge stronger predictor of for younger children, βs=.229 and .085, ps<.01 and .05	emotional expressiveness patterns (a minimal focus)

Table 2 continued

Emotion Understanding (EU) Conceptualization

Study	Age (years)		Study Type	Related Factors*	Factors EU Predicts*	Factors facilitating development of EU*
Denham (2002)	2.7-4.9, M=3.8	N=127	correlational, longitudinal	sex (F sex x agegroup x aggression group (16, 392)=1.65, p<.05), age (new types of emotion knowledge assessed in kindergarten just emerging; F age x agression(20, 392)=2.07, p<.01)	aggression (including anger, anisocial reactions) (ages 3/4 significant main effects of aggression group F(20, 392)=1.73. p<.05)	none
De Rosnay (2002)	3.7-6.4, M=5.1	N=51	correlational	age (r=.36, p<.05), verbal mental age (r=.68, p<.01)	none	mother-child attachment (r=.37, p<.01), self-reliance (r=.40, p<.01), avoidance (r=-.045, p<.01), and overall security (r=.47, p<.01)
Fabes (1991)	M=3.6, M= 4.6, M=5.5	N=62	correlational	age (children's ability to correctly identify others' ngative emotions increased with age (Ms=.69, .72, and .83, ps<.05); sex (sig. for emotional reaction types); type of emotional reaction (significantly moe likely to ID other's happy reactions (M=.83, p<.05) than negative emotional reactions (M=.66, p<.05))	none	social interactions (increasing w/age) (Not discussed data analysis. Age as a proxy)

Table 2 continued

Emotion Understanding (EU) Conceptualization

Study	Age (years)	Sample Size	Study Type	Related Factors*	Factors EU Predicts*	Factors facilitating development of EU*
Fine (2006)	M=4.9 (at start)	N=214	correlational, longitudinal	age (1st grade: large variability in understanding, $F(5, 128)=495.62$, $p<.001$; 3rd grade: scores differed but more similar, $F(5, 125)=123.42$, $p<.00$; 5th grade: more similar, $F(5, 141)=78.20$, $p<.001$); gender (no sifnificant differences)	none	individual differences: verbal ability, (initial status $\beta=.08$, $p<.01$) behavior control (initial status $\beta=.34$, $p<.01$), negative emotionality (growth across time $\beta=-.26$, $p<.05$)
Flavell (2001)	M=5, M=8, college age	N=50	correlational	age (significant differences in age for intuition 1: X^2 (N=60)=31.4, $p<.001$), X^2 (N=60)=24.6, $p<.001$); intuition 2: (N=60)=31.4 $p<.001$); intuition 3: X^2 (N=60)=36.5, $p<.001$; 8 year olds scored much more closely to adults than preschoolers: great growth during elementary-school years)	none	understanding that thoughts engender and accompany emotions (see age correlations)

Table 2 continued

Emotion Understanding (EU) Conceptualization

Study	Age (years)	Sample Size	Study Type	Related Factors*	Factors EU Predicts*	Factors facilitating development of EU*
Izard (2001)	M=5, M=9	N=72	correlational, longitudinal	verbal ability (r=.61, p<.01), sex (not noted in analysis)	predictor of long-term social behavior (Social skills: β=.39, r^2=.09, ps<01; Behavior problems: β=-.31, r^2=.06, ps<.05) academic competence (intercorrelations: r=.43, p<.01; long term: β=.37, r^2=.08, ps<.01))	behavioral control, negative emotionality (temperamental factors)
Lindsey (2003)	3.6-6.7, M=5	N=44	correlational	age (not included in analysis); teacher rated emotional competence (EU prediced small but significant 6% (p<.05) variance in emotional competence with peers); gender (no significant differences)	none	tendency towards pretend play (for girls: r=.20, p<.10; boys: r=,44, p<.05), tendancy towards physical play (no significant differences)

Table 2 continued

Emotion Understanding (EU) Conceptualization

Study	Age (years)		Study Type	Related Factors*	Factors EU Predicts*	Factors facilitating development of EU*
Martin (2005)	3.5, M=3.4	N=50	correlational	gender (no overall significant differences in EU found), children's emotion talk (no significant differences), language ability (predictors of situation knowledge test: PPVT boys r^2=.32, p<.01; PPVT girls r^2=.16, p<.05)	none	maternal emotion talk (total emotion words used with boys only affected Affect Situation Knowledge: r=.43, p<.05)
Ontai (2002)	3, M=3.4, 5, M=5.1	N=81	correlational	age (no analysis on age alone), gender (r=-.30, p<.01), age and gender combined (accounted for marginally significant amount of variance, F(2, 47)=2.52, p<.10	none	parent-child attachment (not significant amount of explained variance), maternal emotion talk (explained 10% variance, FΔ(2, 44)=2.76, p<.07; also, mternal use of gragmatic discourse sig correlated to EU, β=.30, p<.05)
Pears (2005)	M=4.3, M=4.4	N=91	correlational	theory of mind (not directly compared in analysis), age (r=.64, p<.01), intelligence, executive functioning (sroop correct: r=.28, p<.05; card sort correct: r=.31, p<.01)	none	maltreatment (N too small for analysis), in foster care (r=-.42, p<.01) days spent in fost care and number of transitions while in foster care (no significant differences)
Racine (2007)	3-5, M=4.4	N=78	correlational	age (r=.46, p<.01), false belief (r=.35, p<.01)	none	language- parental talk involving use of mental state terms (no significant differences)

Table 2 continued

Emotion Understanding (EU) Conceptualization

Study	Age (years)		Study Type	Related Factors*	Factors EU Predicts*	Factors facilitating development of EU*
Raikes (2006)	2-3, M=2.3. 3-4, M=3.5	N=42	longitudinal	attachment security (r=-.44, p<.01), age (no significant correlations), vocabulary (r=.43, p<.01)	none	maternal depression (at time 1 r=-.38, p<.05), mother-child emotion talk (r=.35, p<.05)
Smith (1998)	M=4.5	N=45	correlational	Maternal age (no significant differences); Education (emotion ID sad r=.39, p<.001; emotion ID surprised r=.52, p<.01; situation knowledge r=.38, p<.01); Income (ID r=.31, p<.05; situation r=.44, p<.01)	cognitive-language ability (emotion ID r=.36, p<.06; situation knowledge r=.46, p<.01); age (ID r=.51, p<.01; knowledge r=.59, p<.0001); social problem-solving strategies (ID r=.35, p<.01; situation : r=.37, p<.0001)	social environment (not specifically measured); experiences (age)
Trentacosta (2006)	1-2 grade, M = 7.5	N=263	correlational, longitudinal	verbal ability (r=.27, p<.01), sex (no significant differences), age (r=.28, p<.01)	attentional competence (fall r=.29, p<01; spring r=.31, p<.01); peer rated emotion expression (anger r=-.17, p<.01; no other emotions significant)	none

Table 2 continued

Emotion Understanding (EU) Conceptualization

Study	Age (years)		Study Type	Related Factors*	Factors EU Predicts*	Factors facilitating development of EU*
Weimer (2005)	3-5, M=4.9, M=4.1	N=60	correlational	false belief (self r=.37, friend r=.42, parent r=.41, composite r=.39, ps<.05), social competence (no significant differences), headstart vs none (no significant differences), age (age, not language, a predictor of EU scores) language ability, sibling, gender (no significant differences)	none	none

* All three of these categories simply represent factors that were correlationally related to emotion understanding. The nature of their relationship (i.e. factors related to EU vs factors predictive of EU) are based on author conceptualization since all studies were correlational, not causal in nature.

**All correlations included are between the factor the correlation follows in the table and emotion understanding (either an agregate emotion understanding score or for a emotion understanding subtest if specified)

Appendix 3

Table 3

Emotion Understanding (EU) Measurement

Study	Emotion Identification	Affective Perspective taking	Response Measurement	Social competence	Verbal ability	Other
Camras (2006)	Verbal presentation of an emotion label accompanied by 4 photos (1 target, 3 distractors), 8 trials for each target emotion	32 vignettes (emotions: happy, mad, sad, scared) with no verbal emotion label, color illustrations w/out facial expresions, photos for selecting emotion depicted in vignette	Total accuracy score of up to 32 for each task: 1 for correct answer, 0 for incorrect answer	no	no	no
Cassidy (2003)	Identification of 4 drawn faces (happy, sad, mad, scared) placed on a puppet's head, incorrect responses corrected, not scored	8 vignettes acted out with a puppet, pictures corresponding to events of stories presented, both situations with typical and atypical responses used	Emotion identification not scored; Affect perspective taking scored as correct or incorrect	peer ratings (presented with pictures of peers and asked to rate how much they like them); teacher ratings (Social Skills Rating System - Preschool Form)	yes (Test of Early Language Development-2, expressive and receptive)	Appearance Reality of Emotions (distinguising between viaully apparent and real emotions- not related to other measures so not included in analysis); mind understanding; child prosocial behavior w/peers (observation)
Colwell (2006)	Identification of emotions in 4 photos of an adult and in 4 line drawings (happy, sad, angry afraid for each). Incorrect answers were corrected on this second part and asked to provide example of when they feel that	13 one-sentence vignettes that would elicit an emotion (happly, sad, angry afraid), children identify correct answer by pointing to appropriate line drawing of an emotional expression	Emotion ID: correct answer and valence; emotional experiences unscored; vignettes: correct answer= 3 points, correct valence = 2 points, incorrect answer and valence = 1 point	teacher ratings: the Dodge Checklist of Social Skills	yes: Peabody Picture Vocabulary Test (PPVT) (receptive vocab)	maternal emotion framing was assessed by coding a mother's verbal responses as she discussed an emotion laden picture book; mother child relationship coded during observation for synchrony

Table 3 continued

Emotion Understanding (EU) Measurement

Study	Emotion Identification	Affective Perspective taking	Response Measurement	Social competence	Verbal ability	Other
Cutting (1999)	4 felt faces portraying happy, sad, angry, frightened expressions. First identified each expressively then receptively	16 vignettes presented using puppets that would elicit an emotion (happy, sad, angry, frightened). Each story acted out w/full vocal and facial cues for the puppet's feeling. The child could respond verbally or by selecting a face for the puppet. 8 typical vignettes, 8 atypical for that child (based on parent report).	Emotion ID and vignettes: correct answer= 2 points, correct valence valence = 1 point, wrong answer and valence= 0 points.	no	yes: receptive vocab using BPVS, and expressive using the Bus Story (child retells a simple story)	false-belief understanding (unexpected-location tasks, unexpected-identity task, and current false-belief tasks), sibling relationship interview, family background
Denham (1994)	4 flannel faces (happy, sad, angry, afraid) used to assess verbal and non verbal identification	20 vignettes using puppets and standardized facial and vocal emotion cues. Subjects were asked to put the felt face onto the puppet the showed the elicited emotion. 8 vignettes were of expected emotions (typical) and 12 atypcial (based on parent report)	Emotion ID and Vignettes: correct answer= 2 points, correct valence valence = 1 point, wrong answer and valence= 0 points.	no	yes: cognitive and expressive language ability (maternal report: Minnesota Child Development Inventory)	causes of emotion (additional EU test in which children were asked to identify an emotion a puppet feels during an interview and why); mother-child emotion conversations (observation); estimated overall language/cognitive abilities (observation)

Table 3 continued

Emotion Understanding (EU) Measurement

Study	Emotion Identification	Affective Perspective taking	Response Measurement	Social competence	Verbal ability	Other
Denham (2003)	no	20 vignettes using puppets and standardized facial and vocal emotion cues. Subjects were asked to put the felt face onto the puppet the showed the elicited emotion. 8 vignettes were of expected emotions (typical) and 12 atypcial (based on parent report)	Unspecified	Peer ratings: asked to classify fellow students via pictures as like-a-lot, kinda like, or do not like. Peer likability scores were calculated; Teacher ratings: The Social Competence and Behavior Evaltuaion Short Form (SCBE)	no	coping behavior: mother rated (likert scale) and observer rated (during freeplay- negative reations to peers' emotions)
De Rosnay (2002)	no	Vignettes depicted by a video of an infact, a mother and a stranger. The infant is left alone in a room and a stranger enters. The child mistakenly believes it will will be the mother. Two versions are shown to each child: one with an invant with high expressed emotion and the other will low expressed emotion.	Child must give correct emotion and explain attribution in terms of protagonist's mistaken belief (this is listed as an emotion understanding task but requires false belief understanding).	no	yes: British Picture Vocabulary Scale (verbal mental age)	false belief understanding: vignettes in which a characher tricks a second character. Scored based on correct emotion elicited and correct explination; mother-child attachment

Table 3 continued

Emotion Understanding (EU) Measurement

Study	Emotion Identification	Affective Perspective taking	Response Measurement	Social competence	Verbal ability	Other
Fabes (1991)	no	An observer roamed during child freeplay. When an overt emotion expression was observed, observer noted and rated emotional reaction and cause. Observer then asked child closest in proximity to event who was uninvolved in incident how target felt and why.	Responses coded on emotion label and explination of emotion's cause, differentiating internal versus external state causes.	no	no	Observed emotional reactions (children expressed overt happy and angry reactions significantly more than they expressed sad reactions (Ms=.39, .35, and .23, ps<.05)
Fine (2006)	no	18 vignettes. Children asked how protagonist would feel at end of each vignette from 6 emotion choices (joy, interest, anger, shame, fear, sadness).	vignettes: correct answer= 2 points, correct valence valence = 1 point, wrong answer and valence= 0 points.	no	yes: Peabody picture vocabulary test (receptive vocab)	parental assessed temperament: BSQ (behavioral style questionnaire)
Flavell (2001)	no	4 vignettes testing 3 intuitions (feelings can be triggered by internal feelings, feelings usually accompanied by thoughts about feeling, and people can change feelings by purely mental means)	Correct score for demonstrating understanding of correct intuition for given story.	no	no	no

Table 3 continued

Emotion Understanding (EU) Measurement

Study	Emotion Identification	Affective Perspective taking	Response Measurement	Social competence	Verbal ability	Other
Izard (2001)	emotion recognition task and emotion-labeling task, both using photos (interst, joy, surprise, sadness, anger, disgust, contempt, shame, fear)	no	Unspecified	teacher ratings: Social Skills Rating System (SSRS)	yes: Peabody Picture Vocabulary Test-Revised (receptive vocab)	parental assessed temperament: BSQ (behavioral style questionnaire)
Lindsey (2003)	Identification of emotions in 4 photos of an adult and in 4 line drawings (happy, sad, angry afraid for each).	13 one-sentence vignettes that would elicit an emotion (happly, sad, angry afraid), children identify correct answer by pointing to appropriate line drawing of an emotional expression	Emotion ID: 1 point correct answer, 0 point incorrect; Vignettes: correct answer= 3 points, correct valence = 2 points, incorrect answer and valence = 1 point	parent ratings: Parent Preschool Characteristics Questionnaire (PCQ); teacher ratings: Preschool Socio-affective Profile; peer ratings: nomination assessment	no	observation of child-peer interaction (form of play and types of interactions noted)
Martin (2005)	4 cardboard faces portraying happy, sad, angry, frightened expressions. First identified each expressively then receptively	20 vignettes using puppets and standardized facial and vocal emotion cues. Subjects were asked to either state how puppet would feel or point to appropriate cardboard emotion face. 8 vignettes were of expected emotions (typical) and 12 atypcial (based on parent report)	Emotion ID and Vignettes: correct answer= 2 points, correct valence valence = 1 point, wrong answer and valence= 0 points.	no	yes: Peabody Picture Vocabulary Test (PPVT) (receptive vocab)	Observation of a storytelling task to determine amount and type of emotino talk used by mother child dyad; mother questionnaire about storytelling task

Table 3 continued

Emotion Understanding (EU) Measurement

Study	Emotion Identification	Affective Perspective taking	Response Measurement	Social competence	Verbal ability	Other
Ontai (2002)	4 felt faces portraying happy, sad, angry, frightened expressions. First identified each expressively then receptively. Incorrect answers corrected	20 vignettes using puppets and standardized facial and vocal emotion cues. Subjects were asked to either state how puppet would feel or point to appropriate cardboard emotion face. 8 vignettes were of expected emotions (typical) and 12 atypcial (based on parent report)	Emotion ID: unscored, teaching task only; Vignettes: correct answer= 2 points, correct valence valence = 1 point, wrong answer and valence= 0 points.	no	no	parent-child attachment assessed by parental report on the Attachment Q-short Version 3.0; observation of mother emotion talk while telling about emotional stories (observation)
Pears (2005)	4 line drawings of faces portraying happy, sad, angry, frightened expressions. First identified each expressively then receptively.	16 vignettes using puppets and standardized vocal emotion cues. Subjects were asked to choose an appropriate line drawing of emotion face for the puppet. 8 vignettes were of expected emotions (typical) and 8 atypcial (based on parent report)	Emotion ID and Vignettes: correct answer= 2 points, correct valence valence = 1 point, wrong answer and valence= 0 points.	no	yes: WPPSI-R Vocabulary subtest (expressive vocabulary)	cognitive abilites (WPPSI-R Block Design subtest), executive functioning (stroop task and a card sort task), theory of mind (perception tasks, desire tasks, belief tasks, and appearance-reality task)
Racine (2007)	5 line drawings of female faces portraying happy, sad, angry, frightened, and surprised expressions. First identified each expressively then receptively.	Children presented with 5 story cards depicting events. Child selects from 5 detachable faces expressing the 5 emotions that would be elicited by the events of the story	Emotion ID: 1 point for correct emotion; Vignettes: 1 point for correct face, 1 point for reporting correct emotion. Scales combined for composite score	no	no	false belief tasks (unexpected transfer and unexpected contents paradigms); observation and coding of parent-child talk about emotions

Table 3 continued

Emotion Understanding (EU) Measurement

Study	Emotion Identification	Affective Perspective taking	Response Measurement	Social competence	Verbal ability	Other
Raikes (2006)	4 felt faces portraying happy, sad, angry, frightened expressions. First identified each expressively then receptively.	20 vignettes using puppets and standardized facial and vocal emotion cues. Subjects were asked to either state how puppet would feel or point to appropriate cardboard emotion face. 8 vignettes were of expected emotions (typical) and 12 atypcial (based on parent report)	Emotion ID and Vignettes: correct answer= 2 points, correct valence valence = 1 point, wrong answer and valence= 0 points.	no	yes: Peabody Picture Vocabulary Test-III (PPVT) (receptive vocabulary)	observations and coding of mother-child emotion conversations; mother-depression inventory; children's attachment security assessed through observation using the attachment Q sort
Smith (1998)	Children presented of line drawings of happiness, fear, sadness, anger, and surprise. The child is to match a criterion picture with the picture with the matching emotional expression.Each set of pictures shown has several matching facial characteristics (such as eyes, emotional expression).	40 brief vignettes describing event likely to elicit one of the 5 emotions. The child could select who the protagonist would feel verbally or by selecting the line picture that depicted the correct emotional expression.	Emotion ID and Vignettes: each item scored 1 point for correct answer and 0 points for incorrect answer.	no	yes: Peabody Picture Vocabulary Test-Revised (PPVT) (receptive vocabulary)	social problem-solving: child measure- The Preschool Interpersonal Problem Solving Inventory; maternal age, education, income

Table 3 continued

Emotion Understanding (EU) Measurement

Study	Emotion Identification	Affective Perspective taking	Response Measurement	Social competence	Verbal ability	Other
Trentacosta (2006)	26 photos of children depicting happy, sad, angry, and fearful expressions. Each picture shown to child who responds verbally with one of the four emotions that matches the photo	15 Social Situations and 15 Social Behaviors vignettes. The vignettes describe prototypical situations or behaviors that would elicit or depict happiness, sadness, anger, or fear. An additional 3 vignettes are ambiguous because they do not depict a prototypic emotion behavior or situation. The child is asked to verbally state if the protagonist is happy, sad, mad, scared, or has no feeling.	Emotion ID and Vignettes: correct answer= 1, incorrect answer=0	no	yes: Stanford-Binet Fourth Edition Vocabulary subtest (expressive vocab)	peer nomination of emotion expression (I.e. which kid in the class are happiest, etc.); teacher assessed child attentional competence with Teacher Observation of Classroom Adaptation-Revised
Weimer (2005)	Picture emotion cards depicting 4 facial expressions (happy, sad, angry, scared). Children asked to label each one. If unable or incorrect, were told correct answer and asked again.	Once child could accurately ID all picutre emotion cards, the child was asked to identify what makes themselves, a friend, and each parent feel each of these emotions.	Picture ID unscored, Child examples scored on a 4-point scale according to adequacy or response (ranging from 0=no response to 4=representing an excellently elaborated response.	parent and teacher ratings using The Adaptive Social Behavior Inventroy (ASBI)	no	false belief tasks (unexpected change task, deception task, unexpected contents task, active decpetion task); language comprehension (The Test for the Auditory Comprehension of Language- Revised ; demographic information

Appendix 4: Tables 17-20 from Chapter 4: Results

Item Level Statistics, Item Difficulty Levels, and Item Response Patterns

Table 17

Item Level Statistics

	Mean	Standard Deviation	Test of Normality
Emotion Identification			
Item 1	2.905	.428	.540
Item 2	2.879	.433	.524
Item 3*	1.894	.992	.364
Item 4	2.841	.453	.507
Item 5	2.579	.793	.464
Item 6	2.262	.893	.355
Item 7	2.774	.546	.494
Item 8	2.810	.591	.531
Item 9	2.259	.931	.370
Item 10	2.810	.591	.531
Item 11*	1.786	.983	.395
Item 12	2.452	.856	.429
Item 13	2.754	.595	.494
Item 14	2.726	.628	.490
Item 15	2.873	.480	.533
Item 16	2.640	.738	.473
Item 17	2.417	.881	.425
Item 18*	2.138	.992	.367

Item 19	2.548	.718	.414
Item 20	2.357	.801	.348
Item 21	2.881	.476	.539
Emotion – Situations			
Item 1	2.441	.883	.439
Item 2	2.500	.871	.467
Item 3	2.429	.796	.383
Item 4	1.976	.537	.363
Item 5	2.155	.526	.389
Item 6	2.786	.622	.528
Item 7	2.120	.684	.271
Item 8	1.988	.885	.261
Item 9	2.667	.750	.505
Item 10	2.582	.763	.446
Item 11	2.274	.812	.314
Item 12	2.595	.746	.456
Item 13	2.119	.568	.357
Item 14	2.536	.648	.382
Item 15	2.524	.857	.473
Emotion – Behaviors			
Item 1	2.642	.6187	.435
Item 2	2.185	.550	.373
Item 3	2.333	.880	.380
Item 4*	1.630	.766	.338
Item 5	2.358	.939	.432
Item 6	2.089	.951	.325

Item 7	1.827	.608	.328
Item 8	2.803	.600	.530
Item 9	2.148	.527	.388
Item 10	2.559	.723	.420
Item 11	2.806	.600	.530
Item 12	2.457	.725	.366
Item 13	2.444	.791	.389
Item 14	2.432	.907	.450
Item 15	2.384	.829	.376

*Highlighted items represent the "flagged" items that had a Corrected Item-Total Correlation of less than .1.

Response distributions

Table 18

Emotion Identification Response Distributions for Total Group, Younger Group, and Older Group

	Happy	Sad	Mad	Scared	No Feeling
Item 1: Total	**80**	0	0	0	4
Younger	**32**	0	0	0	3
Older	**48**	0	0	0	1
Item 2: Total	2	**76**	0	5	1
Younger	2	**32**	0	1	0
Older	0	**44**	0	4	1
Item 3*: Total	4	6	24	12	**36**

Younger	3	2	9	7	**13**
Older	1	4	15	5	**23**
Item 4: Total	0	1	**73**	6	3
Younger	0	1	**28**	4	2
Older	0	0	**45**	2	1
Item 5: Total	2	1	2	**64**	14
Younger	1	1		**26**	0
Older	1	2	0	**38**	7
Item 6: Total	1	**47**	6	6	24
Younger	1	**17**	3	2	12
Older	0	**30**	3	4	12
Item 7: Total	2	4	**70**	5	3
Younger	2	2	**27**	2	2
Older	0	2	**43**	3	1
Item 8: Total	**76**	0	0	1	7
Younger	**30**	0	0	1	4
Older	**46**	0	0	0	3
Item 9: Total	5	4	2	**49**	23
Younger	3	3	0	**15**	14
Older	2	1	2	**34**	9
Item 10: Total	**76**	0	0	0	8
Younger	**28**	0	0	0	7
Older	**48**	0	0	0	1
Item 11*: Total	8	2	33	8	**33**
Younger	4	1	14	3	**13**
Older	4	1	19	5	**20**

Item 12: Total	7	1	5	**58**	13
Younger	4	1	4	**19**	7
Older	3	0	1	**39**	6
Item 13: Total	2	2	**70**	5	5
Younger	2	1	**27**	2	3
Older	0	1	**43**	3	2
Item 14: Total	2	**69**	3	4	6
Younger	1	**27**	2	2	3
Older	1	**42**	1	2	3
Item 15: Total	**78**	0	0	0	5
Younger	**31**	0	0	0	4
Older	**47**	0	0	0	1
Item 16: Total	2	1	**66**	3	11
Younger	1	0	**23**	3	8
Older	1	1	**43**	0	3
Item 17: Total	8	4	1	**57**	14
Younger	5	3	1	**19**	7
Older	3	1	38	**0**	7
Item 18*: Total	5	12	11	8	**47**
Younger	3	3	6	2	**21**
Older	2	9	5	6	**26**
Item 19: Total	2	8	**57**	8	9
Younger	1	6	**19**	3	6
Older	1	2	**38**	5	3
Item 20: Total	4	**47**	5	15	13
Younger	3	**17**	2	4	9

Older	1	**30**	3	11	4
Item 21: Total	**79**	0	0	0	5
Younger	**32**	0	0	0	3
Older	**47**	0	0	0	2

* Highlighted items represent the "flagged" items that had a Corrected Item-Total Correlation of less than .1.
** Bolded numbers indicate that the column within which they fall is the correct answer for that item.

Table 19

Emotion – Situations Response Distributions for Total Group, Younger Group, and Older Group

	Happy	Sad	Mad	Scared	No Feeling
Item 1: Total	8	**45**	**14**	3	14
Younger	4	**15**	**4**	1	11
Older	4	**30**	**10**	2	3
Item 2: Total	**63**	5	1	5	10
Younger	**20**	2	0	3	10
Older	**43**	3	1	2	0
Item 3: Total	10	**52**	9	7	6
Younger	6	**17**	3	4	5
Older	4	**35**	6	3	1
Item 4: Total	4	46	14	**11**	9
Younger	1	22	4	**2**	6
Older	3	24	10	**9**	3
Item 5: Total	2	58	**19**	1	4
Younger	0	24	**6**	1	4

Older	2	34	**13**	0	0
Item 6: Total	2	**58**	**17**	0	7
Younger	1	**19**	**10**	0	5
Older	1	**39**	**7**	0	2
Item 7: Total	5	42	**25**	2	10
Younger	3	20	**5**	0	7
Older	2	22	**20**	2	3
Item 8: Total	21	15	4	**32**	12
Younger	9	7	1	**9**	9
Older	12	8	3	**23**	3
Item 9: Total	**70**	6	0	1	7
Younger	**26**	4	0	1	4
Older	**44**	2	0	0	3
Item 10: Total	5	**62**	4	3	9
Younger	3	**21**	3	3	5
Older	2	**41**	1	0	4
Item 11: Total	4	**19**	23	**23**	15
Younger	3	**6**	19	**9**	7
Older	1	**13**	13	**14**	**8**
Item 12: Total	5	**63**	4	4	8
Younger	3	**25**	1	2	4
Older	2	**38**	3	2	4
Item 13: Total	3	56	**19**	0	6
Younger	2	29	**8**	0	5
Older	1	36	**11**	0	1
Item 14: Total	3	20	5	**52**	4

Younger	1	7	2	**21**	4
Older	2	13	3	**31**	0
Item 15: Total	**64**	4	5	1	10
Younger	**21**	2	3	1	8
Older	**43**	2	2	0	2

** Bolded numbers indicate that the column within which they fall is the correct answer for that item.

Table 20

Emotion – Behavior Response Distributions for Total Group, Younger Group, and Older Group

	Happy	Sad	Mad	Scared	No Feeling
Item 1: Total	6	**33**	10	7	**25**
Younger	4	**11**	3	3	**13**
Older	2	**22**	7	4	**12**
Item 2: Total	1	50	**21**	4	5
Younger	1	21	**8**	1	3
Older	0	29	**13**	3	2
Item 3: Total	22	**20**	9	1	**29**
Younger	11	**5**	4	1	**13**
Older	11	**15**	5	0	**16**
Item 4: Total	11	15	8	**14**	33
Younger	5	7	**3**	**4**	15
Older	6	8	**5**	**10**	18
Item 5: Total	**55**	4	2	6	14

Younger	**18**	1	0	5	10
Older	**37**	3	2	1	4
Item 6: Total	12	**24**	**16**	7	21
Younger	6	**9**	**5**	4	10
Older	6	**15**	**11**	3	11
Item 7: Total	9	38	11	**9**	14
Younger	6	12	8	**3**	5
Older	3	26	3	**6**	9
Item 8: Total	**62**	4	0	4	**11**
Younger	**25**	2	0	2	**5**
Older	**37**	2	0	2	**6**
Item 9: Total	1	56	**18**	1	5
Younger	0	24	**6**	1	3
Older	1	32	12	**0**	2
Item 10: Total	2	**56**	9	4	9
Younger	1	**17**	7	4	5
Older	1	**39**	2	0	4
Item 11: Total	5	**53**	**16**	**4**	3
Younger	4	**19**	**8**	**2**	1
Older	1	**34**	**8**	**2**	2
Item 12: Total	11	18	**31**	4	**17**
Younger	6	9	**10**	0	**9**
Older	5	9	**21**	4	**8**
Item 13: Total	15	**29**	11	4	**22**
Younger	8	**7**	7	2	**10**
Older	7	**22**	4	2	**12**

Item 14: Total	**58**	5	3	5	10
Younger	**20**	4	2	4	4
Older	**38**	1	1	1	6
Item 15: Total	9	**49**	7	6	9
Younger	7	**14**	6	3	4
Older	2	**35**	1	3	5

* Highlighted items represent the "flagged" items that had a Corrected Item-Total Correlation of less than .1.
** Bolded numbers indicate that the column within which they fall is the correct answer for that item.

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