# ABSTRACT

Title of Thesis: GENDER DIFFERENCES IN EMOTION IDENTIFICATION AMONG YOUNG CHILDREN

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Gender differences in emotion competence, including emotion identification, are held in popular belief but are inconsistently supported in the research. Emotion identification (EID) is defined as one's understanding of the experience and expression of emotion, as conveyed through the labeling of the emotions oneself or another person is experiencing. This study investigated gender differences in EID using both the traditional method of comparing scores on a structured task of emotion identification and a comparison of girls' and boys' patterns of responding. An ANCOVA was used to compare girls' and boys' scores on a task of Situational EID across age groups, while children's response patterns were analyzed using chi-squares. Results found few effects due to gender, but many effects due to age. Results are framed in context of the biological and social factors that impact emotion identification.

# GENDER DIFFERENCES IN EMOTION IDENTIFICATION AMONG YOUNG CHILDREN

by

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# Chapter 1: Introduction

This thesis examines differences in how pre-kindergarten and kindergarten-aged boys and girls identify emotions. Emotion identification (EID) is a daily phenomenon: people across cultures recognize that a smile indicates happiness and that someone whose car has broken down is likely frustrated and angry. This knowledge develops throughout each individual's life (primarily in early childhood); however, variation exists in how people identify emotions. Because most EID tasks are scored based on accuracy, meaning the degree to which a participant's response matches the "correct" response determined by task developers, most research examining EID has taken variation in how people identify emotions to mean that certain groups are better at EID than others. For example, people with Autism Spectrum Disorder have demonstrated consistent difficulty with identifying emotions compared to peers (Tanaka et al., 2012) and are often formally taught how to identify emotions based on facial expression (Rice, Wall, Fogel, & Shic, 2015). Such research assumes that there is one best way to identify an emotion in a given scenario. For example, those who say that having a broken down car would make one angry may be seen as better at EID than those who say it would make one sad or worried. Yet a review of the literature demonstrates that there are biological and social reasons for variation in emotion identification. People high in temperamental inhibition, for instance, are hyper-vigilant to potentially threatening stimuli (Reeb-Sutherland et al., 2015) and activate their sympathetic nervous systems more than most (Kagan, Snidman, & Arcus, 1992). Their sensitivity to fear on a task of facial identification (Reeb-Sutherland et al., 2015) is not an error, but rather the result of this biological variation.

Literature has also claimed that girls are superior to boys at EID and related competencies, including emotion regulation and understanding (Cunningham et al., 2009; Denham & Couchoud, 1990; Herba & Phillips, 2004; Reeb-Sutherland, 2015). Rationale include differences in temperamental and physiological factors, likely arising from women's evolutionary need to protect themselves and their young, as well as social factors, like display rules about what emotions are appropriate for each gender to express (Brody, 1985; Hyde, 2014). I theorize that girls do not have superior emotion identification to boys, but simply that girls and boys have different tendencies in how they identify emotions based on biological and social factors, most notably temperament and gender socialization. Because most EID tasks score children's accuracy of responding based on how similar their responses are to those of adult raters (see Appendix A), these differences are mistaken for differential ability. This work aims to explore how analysis of boys' and girls' response patterns on a task of situational EID (i.e. whether a child typically interprets a stimulus meant to represent fear as demonstrative of sadness) yield more valuable information about the development of children's emotional competencies than simple tallies of accuracy. It also aims to explore how gender differences in EID may change during the pre-kindergarten and kindergarten years.

In the following pages, I will define emotion identification and related constructs, overview how it develops and is studied, examine the biological factors that related to EID (particularly temperament and psychopathology), social factors that relate to EID (particularly social learning and gender socialization), and gender differences in EID.

Finally, I discuss the results of a study which compares responses on a task of situational EID in a cross-sectional sample of pre-kindergarten and kindergarten girls and boys.

**Definitions of Emotion Identification and Related Constructs**

Emotion competence (EC) is the ability to experience, respond to, value, and regulate emotions in a socially appropriate manner (Beauchaine & Hinshaw, 2013). These aspects correspond to three skill sets: emotion identification, emotion regulation, and emotion understanding. Emotion identification (EID) is one's understanding of the experience and expression of emotion, as conveyed through the labeling of the emotions experienced by oneself or another. Emotion regulation (ER) is the modification of emotional experiences through cognitive and behavioral responses (Southam-Gerow, 2013). Emotion understanding (EU) is one's conscious knowledge about the experience, regulation, and expression of emotion (Liao, Li, & Su, 2014; Southam-Gerow, 2013, p. 15), or succinctly, conscious understanding of EID and ER. EID is therefore not only a central component of EC but is also a prerequisite for EU, as demonstrated in a study of 191 Australian children ages seven to nine where EID was significantly correlated with EU (Duncombe, Havighurst, Holland, & Frankling, 2013). Examination of the tasks in the study explains the correlation: for the EU task children had to state how they knew when they and others were feeling certain emotions, with higher scores referencing multiple cues and internal states. Each facial, behavioral, situational, or physiological cue to emotions that children named was an individual act of EID. Therefore, children could not perform well on the EU task without having solid EID skills.

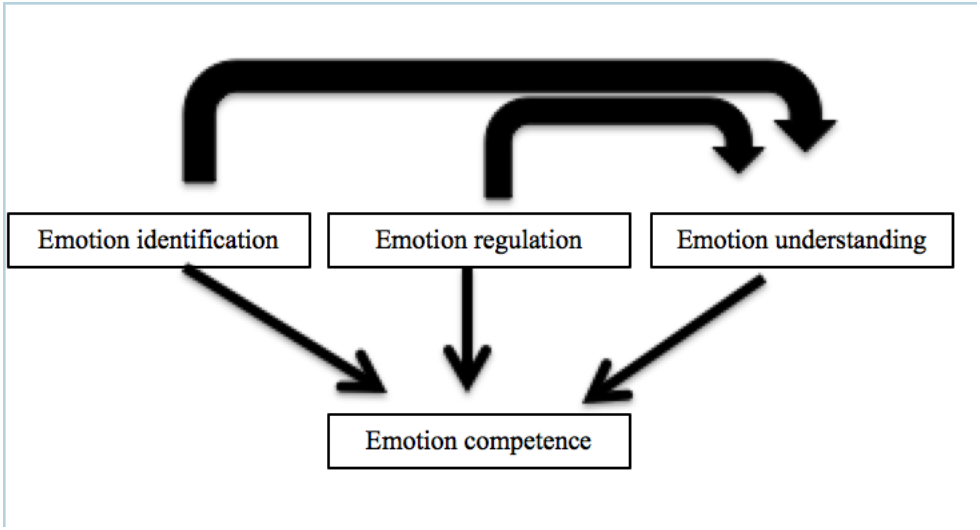


Figure 1. Nomological network of constructs based on definitions provided in the literature

Emotion identification, regulation, and understanding are foundational to social-emotional functioning. People with under-developed emotion competencies may struggle with executive functioning (Martins, Osorio, Verissimo, & Martins, 2016), have difficulty building healthy relationships (Mathieson & Banerjee, 2010), or may develop psychopathologies (Guyer et al., 2007; Norvilitis, Casey, Brooklier, & Bonello, 2000; Rieffe & De Rooij, 2012; Tanaka et al., 2012). A search on PsycInfo demonstrates 1,356 results for EID[1], ER, EU, or EC between July 2015 and July 2016, demonstrating that EC are the subject of much research. Of these results, emotion identification accounts for 28%. Its popularity in research is likely due both to the construct's foundational nature in EC and ease of assessment.

This paper explores EID in depth to examine differences in how boys and girls identify emotions on a task that requires EID given situational emotional cues in short

[1] Terms searched included "emotion identification," "emotion appraisal," "emotion recognition," emotion interpretation," and "emotion understanding" as the construct defined as EID within these paper has been called by these terms in prior research.

vignettes. Emotion identification has already been placed within the broader context of emotion competencies to demonstrate how it relates to other often-discussed emotion-based constructs. Next, I will discuss how EID develops, including a typical trajectory and social and evolutionary theoretical contexts. I will then present a review of the literature, consisting of studies that explore the biological and social factors pertaining to variation in EID and gender differences in EID. I will highlight the trends in each area, gaps in the literature, and relate each topic back to gender.

**Emotion Identification.** Emotion identification has also been referred to as emotion appraisal (Norvilitis, Casey, Brooklier, & Bonello, 2000), emotion recognition (Herba & Phillips, 2004), emotion understanding (Martins, Osorio, Verrisimo, & Martins, 2016), and emotion interpretation (Denham & Couchoud, 1990). All these terms describe a common construct: the act of labeling the emotions oneself or another person is experiencing based on a) facial expression (e.g. smiling), b) body language (e.g. crying, clenched fists), c) situational cues (e.g. puppy died), and/or d) physiological cues (e.g. heart racing; typically for oneself only, but descriptions of others' physiological cues may be used in assessing a person's emotion identification ability). For clarity, only the term EID will be used in this thesis, even if cited authors used a different term, because EID expresses most accurately the phenomena described and hints at the way it is assessed.

Based on a review of recent literature, EID is most commonly assessed with a variation of a facial expression identification task: participants name the emotion conveyed by a depicted expression and are scored for accuracy based on how a number of adult raters would respond (see Appendix A). Other assessment forms involve asking a child what a character feels given certain situational, body language, or physiological

cues and self- or parent-report of EID skills (e.g. ability to identify and describe emotions).

Tasks of EID are typically conducted with young children, up to approximately age seven (see Appendix A); aligning with the ages over which EID skills typically develop (Denham & Couchoud, 1990; Herba & Phillips, 2004; Southam-Gerow & Kendall, 2002; van der Pol et al., 2015). However, scores on tasks of EID are used as predictors even in studies of older children because of the role EID plays in social and emotional skills. For example, difficulty with EID is related to psychopathology (see review below) but many psychopathologies aren't apparent until late teen or adult years. Tasks of EID are used in studies of teen and adult populations to assess the relationship between EID and various mental disorders. The literature review below includes several of these studies, which examined EID in populations between ages 14 and 22.

**Development of Emotion Identification Throughout Early Childhood**

Emotion identification can be based on facial expression, body language, situational cues, or physiological cues. As shown in the literature cited below, most-studied are facial, followed by situational, cues. Emotion identification skills develop primarily between ages 18 months and nine years. At 18 months, children begin to develop language for emotions (Southam-Gerow & Kendall, 2002), which will continue throughout childhood (Herba & Phillips, 2004). By age two, children can correctly identify happy and sad facial expressions during structured tasks (Herba & Phillips, 2004; Southam-Gerow & Kendall, 2002; van der Pol et al., 2015). Their ability to correctly identify emotions based on facial cues improves between ages two and four (Denham & Couchoud, 1990). For example, in a study comparing EID scores of two and four year

olds, both groups were best at identifying happy affect and worst at identifying fear in tasks of labeling facial expressions and using situational cues to identify emotion; however, the older children were significantly better than the younger children at naming and pointing to facial expressions overall (Denham & Couchoud, 1990). Correct identification of angry and fearful expressions are later-developing in EID, typically occurring by age five (van der Pol et al., 2015).

In the elementary years, children come to rely less on facial cues and more on situational cues for EID (Herba & Phillips, 2004). This development is a prerequisite to children's comprehension of the mental aspects of emotion that typically occurs between ages six and seven, and of mixed and moral emotions, typically occurring between ages eight and nine (Liao, Li, & Su, 2014; Southam-Gerow & Kendall, 2002).

Although there is a typical trajectory of EID development, individual factors can influence this process. Both social and biological factors can lead children to have predispositions toward identifying emotions that may be considered incorrect in structured tasks. For example, when given the situation "Green's mother bought an ice cream. Green took one lick and accidentally dropped the ice cream cone. How do you think Green feels?" a child high in anxiety or used to negative encounters with their mother may say that Green feels scared, perhaps because mother will yell at Green for being clumsy. In a task where responses are marked correct or incorrect (as is typical), this child would be marked incorrect for not giving the common reply of Sad.

Research demonstrates that children's "errors" in EID in cases such as this often involve confusion of negative emotions (Denham & Couchoud, 1990) and that performance on EID tasks is predicted by social and biological factors (Martins, Osorio,

Verrisimo, & Martins, 2016). As shown in the literature cited below, the development of EID is related to individual differences, including temperament, psychopathology, parent-child interactions, ethnicity, socioeconomic status, social competence, and vocabulary.

## The Theoretical Background of Emotion Development

Reviews by Brody (1985) and more recently Hyde (2014) explore different theoretical frameworks' explanations of gender differences in emotion competence.

**Biological Theory.** Biological branches of psychology relate humans' evolutionary goals to modern genetics and physiology. According to evolutionary psychology, gender differences in emotion competence are rooted in men and women's respective roles in species survival. Males needed to procreate widely, but were not involved in ensuring their offspring survived to adulthood (Brody, 1985; Hyde, 2014). In order to compete for mates, males expressed dominance through displays of aggression against other males and the animals they hunted (Brody, 1985; Hyde, 2014). In doing so, men were both more responsive to and expressive of anger (Brody, 1985). Contrarily, females had a significant investment in their offspring's survival after pregnancy and childbirth (Hyde, 2014). Women's EID and EU were used to comprehend the needs of preverbal children and care for them responsively, while ER was used to prevent expression of negative emotions (e.g. anger, sadness) that may upset their children (Brody, 1985). Specifically, females may have developed responsiveness to fear because of its role signifying potential danger to offspring (Hyde, 2014). It is unclear from Brody (1985) and Hyde's (2014) reviews, however, why women wouldn't also be more responsive to anger, since interpreting others' anger is instrumental in protecting oneself

or one's children from threat. There is also nothing in evolutionary theory that accounts for females' tendencies toward sadness (Schirmer, 2013).

Support for the biological basis of gender differences in emotion competency comes from physiological differences and behavioral differences' appearance early in life. These differences are associated with temperament, individuals' biologically-based emotional and behavioral tendencies, which are apparent early in life and relatively stable by age three (Bates, 1989; Hyde, 2014; Olino, Durbin, Klein, Hayden, & Dyson, 2013). Studies in the mid-twentieth century found that up to age 18 months, girls and boys placed in upsetting scenarios (e.g. having toys taken away) cried and exhibited anger and frustration in similar frequencies (see Kohnstamm, 1989 for review). After this time, girls' displays of anger declined while boys' remained constant (Kohnstamm, 1989). There is mixed evidence as to whether this represents a decline in girls' experience of anger, or whether girls have simply learned to regulate their anger by this age. Emotion regulation is an aspect of temperament; positively associated with activity in the ventral and dorsal systems and the amygdala (Rothbart, Ahadi, & Hershey, 1994; Schirmer, 2013). As females have greater activity in these regions, they may have more biological capacity for emotion regulation (Schirmer, 2013).

A popular belief is that females experience more sadness while males experience more anger. Again, physiology offers a potential explanation. If girls are able to regulate their emotions earlier on, they learn to inhibit inappropriate emotional responses. This leads girls to experience more internalizing emotions, such as fear and sadness and boys to experience more externalizing emotions, such as anger (Schirmer, 2013). Additionally, males may experience greater anger due to higher circulation of dopamine and

testosterone, both of which are associated with aggression, the physical manifestation of anger (Schirmer, 2013).

**Social Theory.** Within social psychology, the most relevant theory to gender differences in emotion competence is social learning theory, pioneered by Albert Bandura in his famous bobo doll studies (Bandura, 1978). According to social learning theory, children imitate others in their environment, particularly those they look up to (parents, teachers, celebrities, etc). They are also influenced by reinforcement and punishment such that if they or a model are rewarded for a given action they are more likely to repeat it in the future, while they are less likely to repeat actions for which they or a model are punished (Hyde, 2014).

Emotion socialization (ES) is the shaping of children's emotion competence through modeling and active teaching (Rieffe & De Rooij, 2012; Sanders, Zeman, Poon, & Miller, 2013; van der Pol et al., 2015). Each child has a unique socialization experience based on the intersections of their personal identities; such as race/ethnicity, socioeconomic status, and gender; their personal experiences; and their existing social and verbal skills. Emotion socialization by parents is most commonly studied; however, all people (e.g. teachers, peers) and media (e.g. television shows, books) whom the child encounters contribute to emotion socialization (Rieffe & De Rooij, 2012; Sanders, Zeman, Poon, & Miller, 2013; van der Pol et al., 2015).

Central to emotion socialization is the teaching of display rules, or the types and strength of emotions that can be expressed in different contexts (Brody, 1985). In modern western society, display rules dictate that females must excel at EID and EU in order to respond to others' emotions and maintain relationships while males must suppress their

experience and understanding of emotions because they are seen as incompatible with masculinity (Brody, 1985). When children are exposed to gender-based display rules, they adopt these rules into their own behavior and perpetuate gender differences. They then grow up to teach these rules to their own children.

**Theories in Conclusion.** Although emotions have evolutionary purpose and biological basis, emotion competencies as we understand them could not exist without socialization. Socialization allows people to share a common vocabulary for labeling emotions, communicate ways to regulate emotions, and respond to others who express emotions. It is therefore important to consider both the social and biological factors at play in children's EID. Modern research has supported the dual role of biology and socialization in the development of emotion competencies (Denham & Couchoud, 1990); therefore, the remainder of this paper will examine EID using both biological and social lenses in order to explore gender differences in young children's EID and how these differences change during preschool and kindergarten.

## The Present Study

The present study compares emotion identification responses of girls and boys in preschool and kindergarten to assess gender differences in how children identify emotions. The study utilizes a structured task from the Emotion Comprehension Test to assess children's situational emotion identification. Data from the samples are compared using correlational, ANCOVA, and chi-squared analyses. Children are read 15 emotionally-salient scenarios about a gender-neutral puppet named Green. After each scenario, they are asked whether Green feels happy, sad, mad, scared, or no feeling. Children's responses are scored as fully correct (correct emotion identified), partially

correct (correct valence but incorrect emotion), or incorrect (incorrect valence), resulting in scores on the EID task. However, it is proposed that these scores yield an incomplete picture of how children identify emotion. The purpose of this analysis is to answer questions about the role of gender in emotion identification. Based on prior research, it was expected that girls and boys would not differ in their scores on the EID task (accuracy) but would differ in their response patterns of emotion identification. Differences were expected primarily in identification of anger and fear. Age and vocabulary were also assessed, as the following review demonstrates that these variables relate strongly to EID. It was hypothesized that different patterns of gender differences would emerge when assessing the response patterns of older and younger children, due to an increased role of biological and socialized factors for older children. Results are analyzed using social and biological lenses, discussing the roles temperament, (particularly activity, sociability, and fear/avoidance), demographic variables (race/ethnicity and SES), and gender socialization may play.

Table 1. Construct definitions

**Emotion Identification (EID):** One's understanding of the experience and expression of emotion, as conveyed through the labeling of the emotions oneself or another person is experiencing. Labeling is based on 1) Facial expression (i.e. smiling), 2) Body language (i.e. crying, clenched fists), 3) Situational cues (i.e. puppy died), and 4) Physiological cues (typically for self only, but can also be assessed through descriptions of another's physiology; i.e. Sam feels like butterflies are in his stomach). Emotion identification is sometimes referred to as emotion appraisal (Norvilitis, Casey, Brooklier, & Bonello, 2000), emotion recognition (Herba & Phillips, 2004), emotion understanding (Martins, Osorio, Verrisimo, & Martins, 2016), and emotion interpretation (Denham & Couchoud, 1990).

**Emotion Competence (EC):** the ability to a) experience a variety of emotions, b) respond to others' emotions, c) value emotions, d) regulate emotion, and e) achieve emotional self-efficacy (Beauchaine & Hinshaw, 2013).

**Emotion Regulation (ER):** How one modifies emotional experiences through cognitive and behavioral responses (Southam-Gerow, 2013).

**Emotion Understanding (EU):** One's conscious knowledge about the experience, regulation, and expression of emotion (Liao, Li, & Su, 2014; Southam-Gerow, 2013).

**Temperament**: An individual's emotional and behavioral tendencies, which are biologically-based, apparent early in life, and relatively stable by age three (Bates, 1989; Hyde, 2014; Olino, Durbin, Klein, Hayden, & Dyson, 2013)

**Emotion Socialization (ES):** Under social learning theory; the shaping of emotion competence through modeling and active teaching. Emotion socialization by parents is most commonly studied; however, all people (i.e. teachers, peers) and media (i.e. television shows, books) whom the child encounters contribute to emotion socialization (Rieffe & De Rooij, 2012; Sanders, Zeman, Poon, & Miller, 2013; van der Pol et al., 2015).

# Chapter 2: Review of the Literature

The purpose of the present study is to use a situational test of emotion identification to assess gender and age differences in EID. The study examines whether there are gender differences in EID, and whether these differences are exacerbated with age. Differences may be due to the unfolding of biological factors such as temperament, increasing gender socialization, or both, known as gene-environment correlation (Beauchaine & Hinshaw, 2013). The current section reviews factors that relate to how children identify emotions, including temperament, psychopathology, parent-child interactions, culture (ethnicity and socioeconomic status) social competence, vocabulary, and gender. Gaps in the research and how they were addressed in the present study are also discussed.

## Biological Factors in Emotion Identification

**Temperament.** Temperament is an individual's emotional and behavioral tendencies, which are biologically-based, apparent early in life, and relatively stable by age three (Bates, 1989; Hyde, 2014; Olino et al., 2013). Theorists have defined dimensions of temperament in the broad constructs of negative affectivity, surgency, and effortful control (Bates, 1989; Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). Negative affectivity, also known as negative emotionality, is one's tendency to demonstrate fear, anger, sadness, and distress (Bates, 1989; Else-Quest et al., 2006; Rothbart et al., 1994). It includes the concept of difficultness, which consists of frequency of negative mood, withdrawal, and low regulation (Bates, 1989; Else-Quest et al., 2006). Surgency includes sociability, activity, impulsivity, shyness, and high-intensity pleasure (Else-Quest et al., 2006). Sociability is the enjoyment of other's company,

characterized by smiling and laughter (Bates, 1989; Rothbart et al., 1994). Activity is the frequency and intensity of movement. It is associated with arousal: when people are at an uncomfortably low level of arousal, they can increase activity to raise arousal (Bates, 1989). Impulsivity is a tendency to respond quickly without thorough thought (Rothbart et al., 1994). Shyness is slow or inhibited approach in situations of novelty or uncertainty (Rothbart et al., 1994); it has been found to relate to negative affectivity (Teglasi, Schussler, Gifford, Annotti, Sanders, & Liu, 2015). High-intensity pleasure is a person's enjoyment of exciting situations (Rothbart et al., 1994). Effortful control includes the ability to focus and shift attention, persist in a task, and inhibit behavioral responses, as well as low-intensity pleasure (Bates, 1989; Else-Quest, 2006). Low-intensity pleasure is a person's enjoyment in calm and quiet situations (Rothbart, Ahadi, & Hershey; 1994). Inhibition is the tendency to avoid new or uncertain situations and the ability to suppress inappropriate responses (Reeb-Sutherland, 2015; Rothbart et al., 1994).

It is easy to understand how many of these dimensions could influence emotion identification. For example, someone high in negative affectivity may be more likely to identify negative emotions both in themselves and others because they are themselves pre-disposed to fear, anger, and/or sadness. Not much research has explicitly examined the relation between temperament and EID, as it is difficult to disentangle the impact of temperament from socialization. Studies of depression and anxiety, which are influenced by negative affectivity; social competence, influenced by surgency; and inhibition, part of effortful control; are included in this review.

Two studies provide a comprehensive exploration of gender differences in temperamental traits. The first is a meta-analysis of 189 studies, which included 1,196

total analyses (Else-Quest et al., 2006). The majority of analyses were based on adult- or self-report measures; only 43 were based on behavioral observation (Else-Quest et al., 2006). The meta-analysis addresses temperamental variables of effortful control, negative emotionality, and surgency.

The second is an assessment of gender differences in negative emotionality, sociability, impulsivity, and activity among 865 children (54% male) ages three to six (Olino et al., 2013). Because most research on temperament relies on parent report, the authors sought to compare maternal and paternal responses on the Child Behavior Questionnaire to temperament exhibited during 16 behavioral tasks (Olino et al., 2013). For the tasks, facial, bodily, and vocal indicators of positive affect, fear, sadness, and anger were coded on a three-point intensity scale. However, it is important to note that this study overlooked the temperament dimension of effortful control, despite evidence that gender differences in the dimension exist (Else-Quest et al., 2006).

**Negative affectivity/ emotionality.** Else-Quest et al. (2006) found little evidence of gender differences in negative emotionality. Girls were rated as slightly more fearful than boys, while boys were rated as slightly more difficult than girls. In Olino et al.'s (2013) findings, girls were higher than boys in negative emotionality according to maternal report, but differences were non-significant on paternal report or the behavioral tasks. Within negative emotionality, only fear demonstrated consistent findings across informants: girls were rated as higher in fear on behavioral tasks and maternal and paternal reports. Girls were rated higher in sadness than boys on maternal report but not paternal report or the behavioral task, and boys demonstrated higher anger on the behavioral tasks but were not rated higher in anger than girls by either mothers or fathers

(Olino et al., 2013). Together, these studies demonstrate support for temperament-based gender differences in fear, but do not support differences in other aspects of or overall negative emotionality. It may be that social norms impacted data collection. The data collection methods used do not collect true negative emotionality, but rather adult's perceptions of children's negative emotionality, which are formed based on the adult's experiences with the child. Girls could possibly be higher in temperament-based sadness, but only comfortable exhibiting their sadness in front of mothers, rather than fathers or strangers. Boys may be more comfortable exhibiting anger in front of strangers than parents since parents may punish them for their expression (see section on parent-child interactions and psychopathology later in this review).

**Surgency.** In Else-Quest et al.'s (2006) meta-analysis, boys were rated as moderately higher than girls in surgency due to higher ratings of activity, impulsivity, and high intensity pleasure. Girls, however, were rated as slightly higher in both approach and inhibition (shyness). In Olino et al.'s (2013) findings, girls were rated as higher in sociability than boys during behavioral tasks, but differences were non-significant on parental reports. Boys were rated as higher than girls in impulsivity according to behavioral tasks, but differences were non-significant on parent measures. Boys were rated as higher than girls in activity on all three measures. Together these findings support higher temperamental activity and impulsivity among boys and higher sociability among girls. This could have implications for EID in that girls may develop better EID because they enjoy interacting with their peers and are therefore given more chances to practice emotion competencies, including EID, than boys. Boys' EID may be

underestimated by laboratory tasks because their impulsivity may govern their responding.

**Effortful control and inhibition.** Else-Quest et al. (2006) found very large gender differences in effortful control, with girls rated as having better effortful control than boys. Girls were rated as moderately better at attention shifting and inhibitory control, slightly better in attention focusing, and slightly more inclined toward low-intensity pleasure.

A study of 130 children (48% male, 50% with inhibition), ages three and four, did not find gender differences in threat detection, a behavioral proxy for inhibition (Dodd, Hudson, Morris, & Wise, 2012). For the task, children were shown dolls and told three ambiguous story stems, such as "This is the park. Here is the family walking in the park, and look there is this high, high rock. Bob/Jane wants to climb the rock." They were instructed to use the dolls to show how the stories ended. Stories were coded according to whether or not children interpreted the story stems in a threatening or dangerous manner; however, the authors did not give examples of what constitutes a threatening or dangerous interpretation. Across genders, inhibited and anxious children interpreted more ambiguous stories in a threatening way than those low in inhibition and anxiety (Dodd et al., 2012). The authors also conducted anxiety scale follow-ups one, two, and five years later. Children's threat interpretation during the story predicted their anxiety status at baseline and a one-year follow up, but not at two or five years. This demonstrates that the relation between temperamental inhibition and interpretation bias is mediated by anxiety (Dodd et al., 2012)

In a study of 103 adolescents (51% male, mean age 15.6), 42 of whom had high inhibition, Reeb-Sutherland and colleagues (2015) found that both inhibited and uninhibited males had a lower threshold than females for identifying happiness when it was blended with fear or sadness, meaning that ambiguous faces that girls would identify as sad or mad would be identified by boys as happy (Reeb-Sutherland, et al., 2015). This was found using a facial identification task where participants viewed greyscale images of morphed emotion expressions (anger/fear, anger/sadness, fear/happiness, happiness/sadness) in different ambiguity ratios (e.g. 70% happy, 30% sad; 60% happy, 40% sad) and stated which emotion label best describes the image (Reeb-Sutherland, et al., 2015). Additionally, participants who were high in inhibition (as identified based on measured latency and duration of approach to the stimulus during interactions with an unfamiliar examiner, toy robot, and unfamiliar peers in prior phases of the study) were able to identify fear when mixed with anger at a higher ambiguity than participants low in inhibition, demonstrating an ability to discriminate between fear and other negative emotions (Reeb-Sutherland, 2015).

The results of these studies on effortful control and inhibition demonstrate that greater inhibition is associated with increased threat detection and fear. Females are rated higher in inhibition on measures of temperament; however, this result may not always be apparent at a young age and/or in structured tasks. Other studies in this review found relationships between fear and EID scores (Denham & Couchoud, 1990) and sociability and EID scores on tasks requiring facial EID accuracy (see section on social competence). Together, this suggests a relation between gender and temperament-based EID.

**Temperament in conclusion.** Overall, only significant gender differences in fear, sociability, and activity were seen in multiple studies. In follow-up analysis, Else-Quest et al. (2006) found that for factors of surgency, gender differences were larger in school-age children than preschool-aged children. This, combined with the results outlined above, lead the authors to suggest that the "small gender differences [in temperament] may be magnified by gender role socialization and social interaction such that larger differences are seen in older children" (Else-Quest et al., 2006, p. 62). This conclusion is congruent with my hypothesis that gender differences in EID will increase over time in association with developing biology and socialization.

**Psychopathology.** Psychopathology is clinically significant, distressing exaggeration in behavior. It may involve violation of social norms and/or be difficult or impossible to cope with (Adams & Sutker, 2004). Psychopathology includes (but is not limited to) depression, anxiety, bipolar disorder, severe mood dysregulation, and autism spectrum disorders, which are marked by difficulty coping or socially inappropriate responses to emotion. It is therefore unsurprising that these pathologies have been associated with poor emotion competency, including EID.

A study of children ages 7-18 was conducted to examine the relation between psychopathology and errors in EID (Guyer et al., 2007). Participants included 42 children (52% male) with bipolar disorder, 39 (72% male) with severe mood dysregulation, 44 (52% male) with anxiety or major depressive disorder, 35 (71% male) with ADHD or conduct disorder, and 92 (51% male) controls; children were assessed for psychopathology using the Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version (K-SADS-PL). Children were shown

photographs of children and adults displaying high- or low-intensity happiness, sadness, anger, or fear, and pressed a button for which emotion was depicted. No credit was given for identification of an incorrect emotion of correct valence (Guyer et al., 2007). The researchers found a significant effect of emotion: overall, the most errors were made in identifying angry faces, second most in identifying fear, and third most in identifying sadness. There was also a significant main effect for pathology: children with bipolar disorder and severe mood dysregulation performed significantly worse overall than children in other groups (Guyer et al., 2007). These results demonstrate that though children generally develop EID skills by age five, many may continue to have difficulty with EID after that age, especially children with psychopathologies. Children with bipolar disorder and mood dysregulation may have a particularly difficult time differentiating emotions.

Gender was included as a covariate in the analysis, along with age, IQ, and ethnicity. However, the unique role of gender in the relation between psychopathology and EID was not analyzed. This is an oversight because other research has found gender to be an important factor in both EID (see section on gender differences in EID below) and psychopathology (Beauchaine & Hinshaw, 2013).

**Depression and anxiety.** Internalizing disorders in the categories of depression and anxiety are often comorbid (Beauchaine & Hinshaw, 2013); however, they exhibit different developmental trajectories and patterns of gender differences. Anxiety is twice as common in girls than boys, and twin studies demonstrate support for a biological basis (Beauchaine & Hinshaw, 2013). This aligns well with temperament studies that found gender differences in children's fear (Else-Quest et al., 2006; Olino et al., 2013). Rates of

depression are similar in boys and girls until they reach adolescence, at which point girls' rates exceed boys' (Beauchaine & Hinshaw, 2013). Possible reasons for this change include hormones, stress, and social vulnerabilities (Beauchaine & Hinshaw, 2013). Results from a longitudinal study of 663 Dutch preadolescents (56% male, mean age 10:3 at Time 1) show that gender and EID predict a significant proportion of children's vulnerability to depression and anxiety over two years (Rieffe & De Rooij, 2012). Emotion identification was assessed using the Emotion Awareness Questionnaire (EAQ30), while depression, fear, and worry/rumination were assessed using the Children's Depression Inventory, Fear Schedule, and Worry/Rumination Questionnaire respectively. Gender and EID explained 32% of variance in depression at time one, 37% of variation in fear, and 53% of variation in worry/rumination. Gender alone had a significant impact on the intercepts of fear and worry/rumination, such that girls had significantly higher scores in both compared to boys when controlling for EID (Rieffe & De Rooij, 2012). This is consistent with existing knowledge that gender impacts girls' anxiety but doesn't impact depression until adolescence (Beauchaine & Hinshaw, 2013). These results demonstrate the impact of EID on depression and anxiety; however, despite the longitudinal data collection, no conclusions were made about the possible impact of depression on EID.

**ADHD.** ADHD has been found to correlate negatively with children's EID on open-ended tasks but not forced-choice tasks (Norvilitis et al., 2000). A study of 44 children (70% male; mean age 10.27) with ADHD, as assessed using the Conners' ADHD subscale and K-SADS-PL, and 36 comparison children (55% male) examined the relationship between ADHD and children's ability to identify their own and others'

emotions (Norvilitis et al., 2000). EID was tested in three ways. First children identified facial expressions of single or blended emotions and were scored on accuracy and valence. Second, children listened to a tape of conversations in which happy, sad, anxious, or angry emotions were expressed and were asked what emotion was expressed and why. Third, children watched a videotape of a same-gender child demonstrating happy or angry affect and were asked how they thought the child was feeling, to identify which of five faces was closest to the emotion the child was experiencing, and how they felt while watching the tape. Children were video recorded, and reports of their own emotions were scored in comparison to rater's assessments of their emotion from watching the video recording. Participants with ADHD did not perform differently from comparison children on the forced-choice affect identification task, but performed worse on the open-ended auditory task. Participants' ADHD was negatively correlated with ability to identify their own emotions during the video task but not ability to identify the emotions of the child depicted in the video. Together these results demonstrate that children with ADHD, at least in middle childhood, are proficient in structured EID tasks but may struggle with EID in daily life, where choice options are not presented. They also may struggle more with identification based on physiological and situational cues than facial expression and body language (Norvilitis et al., 2000).

The authors conducted the same analyses with only males from the study and found nearly identical results. However, due to the small number of girls it is possible that the two genders would have significantly different patterns of EID but that this difference was too weak to be detected. This would be a particularly interesting area for study since overall girls have shown to be more attentive than boys (Else-Quest et al.,

2006) and often have more severe levels of impairment before being diagnosed with ADHD (Beauchaine & Hinshaw, 2013). Gender differences are supported by a 2:1 male: female rate of ADHD diagnosis (Beauchaine & Hinshaw, 2013).

**Autism Spectrum Disorder.** Conflicting results have also been seen in studies of children with Autism Spectrum Disorder (ASD), with differences from typically-developing children found on forced-choice but not open-ended tasks. Tanaka et al. (2012) found that children with ASD were less accurate in EID than comparison children. Eighty-five children (84% male) with ASD and 130 comparison children (67% male), ages 5-20, completed three forced-choice EID tasks. One required labeling expressions of affect, one matching two faces that displayed the same emotion, and one assessed ability to identify emotion based on an individual's facial features. Typically developing children were more accurate than children with ASD on the first two tasks; however, no difference was found on the third. In both groups, happiness was identified most accurately and fear and disgust were identified least accurately, similar to findings by Guyer et al. (2007), reviewed above. IQ was found to mediate performance for children with ASD. Gender differences were not assessed, possibly due to small and uneven sample sizes (Tanaka et al., 2012). Assessment of gender differences in EID among children with ASD is worth study because ASD affects 4.5 times as many boys and girls, and presentation shows gender differences, with ASD-diagnosed girls often having comorbid severe intellectual disabilities (Beauchaine & Hinshaw, 2013).

**Psychopathology in conclusion.** These studies demonstrate how psychopathologies, including bipolar disorder, severe mood disregulation, depression, anxiety, ADHD, and autism spectrum disorder relate to difficulty with EID (Guyer et al.,

2007; Norvilitis et al., 2000; Rieffe & DeRooij, 2012; Tanaka et al., 2012). There are two weaknesses in review of this work, however. First, a variety of tasks are used to assess EID in older children, as opposed to the emphasis on simple affect recognition seen in younger children. This is beneficial in that it makes the tasks more challenging, uses a wider variety of EID methods, and moves away from an emphasis on detection of commonly perceived emotions ("accuracy"); unfortunately, it also makes it difficult to compare findings to one another. More standardized procedures or more comprehensive studies, such as that by Guyer and colleagues (2007) would help alleviate this weakness. Second, research on psychopathology and EID acknowledges gender as an influencing factor; however, by including it as a variable to be controlled these studies fail to account for its impact. Future research may look at gender as predictive of both psychopathology and EID.

**Social Factors in Emotion Identification**

Gender differences are biologically based but socially enforced, such that biological predisposition and socialization continuously impact one another (Lippa, 2002). The American Psychological Association defines gender as the set of behaviors, roles, and attitudes that society has deemed appropriate for boys/men or girls/women (APA, 2014). This includes behaviors, roles, and attitudes regarding emotion, which are taught through emotion socialization. The following section explores how social factors including parent-child interactions, culture (such as ethnicity and socioeconomic status), vocabulary, and a child's existing social competence relate to emotion socialization, contributing to gender differences in EID.

**Parent-Child Interactions.** Emotion socialization (ES) includes parental expressions of emotions in presence of their children, reactions to children's emotions, and parent-child conversations about emotions (van der Pol et al., 2015). It requires the parent's own emotion competence, as well as mentalization, or ability to value and understand the child's thoughts and emotions (Karstad, Wichstrom, Reinfjell, Belsky, & Berg-Nielsen, 2015). Parents' skills in their interactions with their children are essential to children's psychological well-being (Sanders et al., 2013; Shortt, Katz, Allen, Leve, Davis, & Sheeber, 2015) and ability to talk about and understand emotions (van der Pol et al., 2015). Numerous studies have observed differences in emotion socialization by parent and child gender, demonstrating that parents give their children gender-specific messages about emotions.

The most telling study comes from van der Pol and colleagues (2015), who had 317 two- parent, two-child (ages two to five; 75 girl-girl, 81 girl-boy, 85 boy-boy, and 76 boy-girl) families discuss a picture book in which gender-neutral children were expressing emotions. Mothers and fathers were asked to discuss the book with their children, and were coded for the frequency with which they talked about emotions, emotion behavior, and emotion causes as well as the gender labels they used to describe the depicted characters. There were not significant differences between children's genders in the frequency with which parents talked about emotions; however, parents' choice of gender labels during the activity was markedly gender-stereotypical. Parents used the label "boy" more often than the label "girl" when the depicted child was expressing anger and "girl" more often than "boy" when the child expressed sadness or happiness. These findings are notable because they suggest that boys' tendency toward

anger and girls' tendency to sadness and happiness (see Hyde, 2014; Else-Quest et al., 2006) may be reinforced by verbal parental modeling.

A similar parent-child interaction task involving 50 mother-child dyads (children age three; 50% male) was conducted by Martin and Green and demonstrates the significance of mother's talk about emotions in the development of their sons' EID and ability to talk about emotions (2005). In this study mothers told their child a story using four scripted story points; their telling and their children's responses were coded for type and variety of emotion words and explanations used (collectively called "emotion talk"). Children then completed three EID tasks, first naming the affect depicted in a picture (happy, sad, angry, or scared), then pointing to the facial expression representative of each named emotion, and finally identifying how a puppet feels in 12 vignettes that involved cues of body language and verbal comments (Martin & Green, 2005). Mothers' emotion talk during the interaction was significantly positively correlated with boys' emotion talk but not girls. Additionally, mothers' emotion talk was correlated with boys' but not girls' scores on EID tasks, particularly the task of situational EID (Martin & Green, 2005). This suggests socialization by mothers is more important for development of boys' than girls' emotion competence. Girls and boys scored equally well on the EID tasks (Martin & Green, 2005), but analysis was not undertaken to see if they differed in patterns of responding.

**Parent-child interactions and psychopathology.** Sanders, Zeman, Poon, and Miller (2013) investigated the relation between emotion socialization and children's depression, which has been shown in other research to relate to difficulty with EID (Rieffe & De Rooij, 2012). Eighty-four children (57% male) between the ages of 8 and

11 responded to the Emotions as a Child Scale, which assesses maternal and paternal unsupportive responses to displays of anger and sadness. Unsupportive responses as measured by the EAC included neglect, punishment, magnification, overriding, and reward (reverse coded; Sanders et al., 2013).

The authors found that overall, children's perception of unsupportive parental responses to anger and sadness was associated with greater mood dysregulation, poor coping, and depression symptoms (as assessed by parent-report of children's anger and sadness management and child-report depression inventory). They also found that this relationship could be further analyzed by parent gender. Depressive symptoms were associated with children's reports of mothers' unsupportive responses to sadness and fathers' unsupportive responses to anger. The only difference by child gender was of higher parent reports of girls' coping than boys' (Sanders et al., 2013). These results do lend support to the importance of parental ES in children's emotional development and development of psychopathology. However, the lack of findings pertaining to child gender is striking when considering that girls are more likely to develop depression than boys (Beauchaine & Hinshaw, 2013). It is unlikely that girls experience significantly more unsupportive responses to anger and sadness than boys; indeed, other studies have found that girls' emotional expressions are typically more supported than boys' (Herba & Phillips, 2004). Therefore, this difference is likely due to other factors at play in the relationship between ES and psychopathology (such as pre-existing vulnerability, see Beauchaine & Hinshaw, 2013) and/or a sample size too small to detect gender differences. Further, a similar study by Shortt, Katz, Allen, Leve, Davis, and Sheeber

(2015) with larger sample and older population did find gender differences in the relation between ES and depression.

Shortt and colleagues (2015) assessed 107 teens ages 14 to 18 (39% male) and their parents; 47 of the children were diagnosed with depression. Children in this study completed the Coping with Children's Negative Emotions Scale, which assesses unsupportive responses to displays of anger and sadness. The CCNES defines unsupportive parental responses as punishment, minimization, distress, and anger. The authors found evidence of a connection between depressive symptoms and punishment, but not other forms of unsupportive ES (Shortt et al., 2015). For boys, depressive symptoms were associated with child-reported parental punishment in response to sadness. For girls, symptoms were associated with perceptions of fathers' (but not mothers') punitive responses to anger. These results demonstrate that punishment of anger is associated with depression. From a social learning perspective, punishing expressions of anger discourages their expression in the future. This increases internalizing, putting children at risk for internalizing disorders like depression. The finding for girls is particularly interesting in connection with Martin and Green's (2005) findings suggesting mothers' ES is more important for development of boys' emotion competency.

A study by Pasalich, Waschbusch, Dadds, and Hawes (2013) reiterates the role of cross-gender parents in children's ES. In their study of 111 seven to 12 year olds (76% male), parents' completed self-reports of emotion socialization in response to children's expression of anger and sadness found that reports of lack of maternal acceptance of anger and sadness as well as nonplussed reactions to children's emotional expression

were associated with parent- and teacher-ratings of disruptive behavior and callous-unemotional traits, which are implicated in disorders ranging from ADHD to conduct disorder (see DSM-5). Additionally, for boys but not girls callous-unemotional traits were positively correlated with mothers' emotion dismissing Pasalich et al., 2013).

Together the findings from Martin and Green (2005), Shortt et al. (2015), and Pasalich et al. (2013) suggest that children receive socialization messages more strongly from members of other genders than their own. This connection merits further study. The findings from Sanders et al. (2013), Shortt et al. (2015), and Pasalich et al. (2013) document a connection between unsupportive, unaccepting, and punitive emotion socialization and psychopathology that is moderated by child gender. Since connections between psychopathology (depression), gender, and EID have also been found (Rieffe & De Rooij, 2012), future research should analyze the interrelationships between these four variables.

**Parent-child interactions and culture.** Because gender is enforced by society (APA, 2014), different cultures may have different gender norms for emotion socialization. Culture comprises the cultivated behaviors, beliefs, and values of a group of people (Texas A&M, 2016). In this review, culture is discussed in the contexts of ethnicity and socioeconomic status. Three studies demonstrate cultural differences in ES, two of which found differences related to gender.

In a study comparing 245 white, black, and Lumbee Native American families with children between the ages of four and ten (53% male) interactions were found between ethnicity and parent gender and between ethnicity and child gender (Brown, Craig, & Halberstadt, 2015). Using results from the Self-Expressiveness in the Family

Questionnaire and Coping with Children's Negative Emotions Scale, the authors measured self-reported parental positive and negative expression and supportiveness. For white families, boys' mothers reported being more supportive than fathers. For black families, girls' mothers reported being more supportive than fathers, whereas boys' mothers reported being less supportive than fathers. For Lumbee families, no differences were found pertaining to child gender but overall Lumbee fathers reported being more negatively expressive than mothers. White and black mothers and fathers were equally positively and negatively expressive while Lumbee mothers and fathers reported being equally supportive (Brown, Craig, & Halberstadt, 2015). These results demonstrate not only that parents provide different ES to sons and daughters, but also that fathers and mothers provide different ES and that these differences vary across cultures.

Another study compared emotion socialization in Midwestern United States, a traditional urban area in India, and a modern suburban area in India (Raval, Raval, Salvina, Wilson, & Writer, 2013). The traditional Indian sample had below-average income for their region, while United States and suburban Indian samples were above average. The sample of 180 was evenly divided by location, age (1st or 4th grade), and child gender. Mothers responded to the Parent Response to Children's Emotions Questionnaire and Coping with Children's Negative Emotions Questionnaire. In response to children's expressions of anger and sadness, US mothers reported being sympathetic and encouraging of expression, traditional Indian mothers reported being angry and worried, and suburban Indian mothers reported being solution-focused and encouraging of expression. This study reveals cultural differences as well as socioeconomic status differences in socialization of children's emotions. Despite different cultural contexts,

both the US mothers and suburban mothers reported being encouraging of their children's emotional expression, suggesting that wealthier parents see this as a beneficial technique (Raval et al., 2013). Gender differences were not analyzed, but based on generalizations from other studies reviewed, gender differences could be expected both within and across cultures.

Other research has demonstrated differences in ES by socioeconomic status (SES). In a study of urban African-American 9 to 13 year olds and their female parents/caregivers, parents' education level predicted their awareness of their own and their children's emotions as well as acceptance of their children's emotions on a semi-structured meta-emotion philosophy interview (Cunningham, Kliewer, & Garner, 2009). Using a five-point scale and examples, the awareness scale inquired about parent's ability to recognize and describe emotions, understand emotions' causes, and provide examples of given emotions; the acceptance scale inquired about the ability to openly share and express their own emotions and how the parent responds when the child expresses emotions (Cunningham et al., 2009). Children completed an emotion understanding task in which they were given conflict scenarios and asked how they would feel in the given scenario, what they could do to regulate their feelings, how they thought the other person in the conflict would feel, and why the other person would feel that way. Parental awareness, acceptance, and coaching about emotions were in turn related to parents' ratings of girls' social skills and boys' internalizing behavior, with child emotion understanding as a mediator (Cunningham et al., 2009). Research on vocabulary, an indicator of SES, corroborates the connection between SES and social outcomes (Martin & Green, 2005). This literature is discussed later in this review.

Boys had significantly higher composite internalizing scores than girls in this study, which is unusual in light of several studies that find girls to have higher sadness, fear (Ciarrochi, Heaven, & Supavadeeprasit, 2008), and diagnosis of internalizing disorders (Beauchaine & Hinshaw, 2013). It may be that parents are more attentive to boys' internalizing behaviors, when similar levels of internalization by girls would be regarded as normal, and therefore not rated as highly.

**Parent-child interactions in conclusion.** These studies demonstrate how social factors relate to parents' ES of their sons and daughters. In keeping with display rules, parents reinforce gender stereotypes of boys as angry and girls as happy or sad when conversing with their children about emotions (van der Pol et al., 2015). In response to children's displays of anger and sadness, parents who utilize punitive and unsupportive ES are more likely to have children with depression (Sanders et al., 2013; Shortt et al., 2015), which is associated with low EID as measured by the EAQ30 (Rieffe & DeRooij, 2012). Finally, parents' ES of girls and boys differs by ethnicity and SES. Wealthier families are more accepting and encouraging of children's emotional expression than poorer families. This is important to keep in mind in future studies.

**Social Competence.** Social competence is both socialized and innate (Semrund-Clikeman, 2007). It is aided by sociability, the temperament-based enjoyment of others' company (Bates, 1989; Semrund-Clikeman, 2007). It also develops through routine social interactions and formal lessons, with rules dictated by contemporary and local culture (Semrund-Clikeman, 2007). Scores on tasks of EID have been positively associated with social competence in four studies of children.

Mathieson and Banerjee (2010) investigated the relation between performance on EID tasks and pro-social play as rated by parents and teachers among 195 one to four year olds. Adults rated children on the Penn Peer Interactive Play Scale, which measures social competencies, like sharing and collaboration, in play settings; Goodman Strengths and Difficulties Questionnaire (SDQ), which measures emotional symptoms, conduct problems, hyperactivity, peer problems, and pro-social behavior; and Child Behavior Questionnaire (CBQ), a measure of temperament. The children completed behavioral tasks which required them to 1) indicate which of two photos depicts a particular emotion (happy, angry, or sad), 2) indicate which of 3 puppet faces demonstrates a particular emotion (happy, angry, or sad), and 3) verbally state what each puppet feels. Their responses were scored as fully correct, incorrect, or correct valence but incorrect emotion (tasks 2 and 3 only). Children's scores on the EID tasks were significantly positively correlated with parents' and teachers' pro-social ratings on the SDQ and Penn Peer Interactive Play Scale but not the CBQ (Mathieson & Banerjee, 2010). This finding indicates a weak connection to temperament-based sociability, which may be due to the young age of the participants. Temperament is not stable until at least age three (Olino et al., 2013), which means that the children in this study may be too young for reliable assessment of sociability on the CBQ. Further, gender was not assessed despite research demonstrating gender differences in sociability (Else-Quest et al., 2006; Olino et al., 2013).

Laghi, Baiocco, Norcia, Cannoni, Baumgartner, and Bombi (2013) used the Test of Emotion Comprehension (TEC) to assess children's emotion competence and the Pictorial Assessment of Interpersonal Relationship (PAIR) to assess closeness and

reciprocity of peer relationships among 251 Italian six year olds (44% male). For the TEC, children listened to stories and picked which of four emotions best described how the protagonist felt. Children received points on the TEC for answering one or more items correctly. For the PAIR, children drew a picture of themselves with their best friend then named the best friend they had drawn in the picture. A friendship was counted as reciprocal if children in the same class selected one another as best friends, unilateral if child selected a classmate as best friend but was not reciprocated, and was not counted if the child identified a non-classmate as a best friend (Laghi et al., 2013). Children in reciprocal peer relationships had higher scores on the TEC than those in unilateral relationships (Laghi et al., 2013). There was not gender difference in the number of reciprocal friendships or scores on the TEC (Laghi et al., 2013).

Liao, Li, and Su (2014) had 47 four to six year olds (49% male) perform two EID tasks, first pointing to the face that displayed a given affect, then pointing to two of four faces that were representative of the same emotion. Participants then were shown scenarios of physical, verbal, and relational aggression involving human and animal cartoon figures and were asked to rate the victim's post-conflict emotion on a 7-point scale from very sad to very happy. Finally, participants were asked whether or not they thought reconciliation between the characters in the conflict scenario was likely (Liao et al., 2014). Children's performance on the EID tasks predicted their reconciliation tendency for the physical and relational aggression scenarios after controlling for age and gender. Gender was not a significant predictor of either physical or relational aggression (Liao et al., 2014).

In a study of emotion and social competence, 796 high school students (51%

male) completed the Toronto Alexithymia Scale, a self-report measure of emotion identification and understanding, and were asked to identify their five closest friends of either gender (Roswell, Ciarrochi, Heaven, & Deane, 2014). Participants received scores based on the number of male and female classmates who nominated them as a close friend. There were several gender differences in friendship nominations, but the result of most relevance to this review is that a significant correlation was found between girls' self-reported emotion competence and their number of close friendships. This suggests that by high school, EID skills have demonstrated impact on girls' social relationships. The same was not true for boys.

These studies demonstrate positive correlations between EID skills and social competence. None of the first three studies found gender differences in social competence of one to six year olds. This at first may seem contrary with research finding gender differences in sociability (Else-Quest et al., 2006; Olino et al., 2013); however, the last study's indication that EID skills are relevant to girls' social competence but not boys' suggests these findings are relevant to a larger difference in girls' and boys' friendship formation. Because girls are temperamentally more sociable, they may use social skills to develop relationships with other females, simultaneously strengthening their emotion competencies. Boys may form and strengthen relationships in a manner that does not require as strong social or EID skills (see Rose, Smith, Glick, & Schwartz-Mette, 2016 for a study of gender difference in adolescents' use of social skills with friends). This difference, though beginning to appear in early childhood (Dunsmore, Noguchi, Garner, Casey, & Bhullar, 2008), may not be fully apparent until adolescence.

It is important for future study of both social competence and EID to understand when gender differences emerge and how boys and girls each use EC in their relationships.

**Vocabulary.** Five of the studies from this literature review explored vocabulary as a potential contributing factor in children's EID. vocabulary is used as an indicator of both socioeconomic status (Martin & Green, 2005) and intellectual development (Sattler, 2008).

In a study of 974 Norwegian four to seven year olds (48% male), vocabulary was positively correlated with EID scores, parent's emotion socialization and beliefs about their children's EID, children's social skills, and the family's SES (Karstad, Wichstrom, Reinfjell, Belsky, & Berg-Nielsen, 2015). It was not correlated with child gender when controlling for other factors. vocabulary was assessed using the Peabody Picture vocabulary Test, Third Edition; EID through the TEC (Karstad et al., 2015).

De Stasio, Fiorilli, and Di Chiacchio (2014) also investigated the relation between EID scores on the TEC and vocabulary, this time as measured by the Italian Test for Reception of Grammar. Among 102 three to six year olds (53% male), the authors found that vocabulary was positively correlated with EID scores, age, and fluid intelligence (measured via Raven's Colored Progressive Matrices). In hierarchical multiple regressions, age and verbal ability were significant predictors of total scores on the TEC and external emotion comprehension, which measures EID (De Stasio et al., 2014). The authors did not assess the role of gender.

In a study of 74 four year olds (% male unknown), Martins, Osorio, Verissimo, and Martins (2016) found that language ability was a significant predictor of scores on a situational EID task. Children's vocabulary was assessed using the Wechsler Preschool

and Primary Scale of Intelligence, Revised and Peabody Picture vocabulary Test. To assess EID, children were given a questionnaire in which they had to identify whether a given situation would make a child happy, mad, sad, or scared. Children scored 2 point for identifying the correct emotion, 1 for correct valence, and 0 for an incorrect response. The authors determined that social factors, including mother's age, child language ability, and theory of mind; and biologically-based factors, such as child IQ, inhibitory control and set shifting, predict 40% of variance in emotion identification scores. Gender, however, was not assessed (Martins et al., 2016).

Two studies reviewed above also assessed vocabulary. In the study reviewed above by Martin and Green (2005), picture vocabulary scores (assessed via the Peabody Picture vocabulary Test) and mothers' cause-focused emotion explanations were significant predictors for the boys' situation knowledge and composite EID scores. Additionally, picture vocabulary scores significantly predicted girls' scores on a task of situational EID (see section on parent-child interactions). In the study above by Norvilitis and colleagues (2000), the Peabody Picture vocabulary Test-Revised was used to test for language differences between the participant groups with and without ADHD. No language differences were found between the groups, and results on the vocabulary test were not correlated with any other variable in the study. In this sample of 80 pre-adolescent children, no relationship between vocabulary and EID was found (see section on ADHD).

The results of these five studies give support to a relation between vocabulary and EID scores, but lack evidence for or against a relation between vocabulary and gender. A meta-analysis by Hyde and Lin (1988, see Hyde, 2014 for review) did not find gender

differences for vocabulary, but did find a small gender difference for verbal fluency. Therefore, it is possible that genders may have equal vocabularies for EID but girls may be more capable of utilizing their vocabularies to express themselves, particularly during structured assessments.

**Gender Differences in Emotion Identification**

Despite claims that girls possess superior emotion competencies, studies find little difference between the genders once other biological and social variables are controlled for.

Denham & Couchoud (1990) found gender differences among two to four year olds on EID tasks that require verbal responses, but not on those that require behavioral response. In their study of 45 children (56% male), participants were asked to name the emotion depicted by a pictured face (options: sad, happy, angry, scared), point to pictured faces that matched given emotions, and affix the emotional expression to a puppet that best described how it was feeling in a given situation. All tasks were scored as correct or incorrect. On the first task, girls were significantly more likely than boys to correctly identify fear, resulting in higher scores. No gender differences were found on the other two tasks. These results are consistent with the above findings that girls have better average verbal fluency than their male counterparts. In a similarly-aged sample, described in detail in the preceding section, Karstad et al. (2015) did not find gender differences in EID when controlling for the social factors of vocabulary and SES (see section on vocabulary).

In a study of 191 (72% male) with seven to nine year olds, Duncombe, Havighurst, Holland, and Frankling (2013) failed to find a relationship between gender

and either emotional competence or effortful control when controlling for hyperactivity and IQ. Emotion identification and understanding were assessed using the Kusche Affective Interview-Revised, in which children had to name the emotion depicted in a presented photograph (options included happy, sad, scared, and angry), generate a list of feeling words, and describe how they know when they and others are feeling happy, scared, sad, angry, and jealous. The first task was scored for accuracy, the second for quantity, and the third for references to multiple cues and internal states. Emotion regulation was assessed using the Emotion Regulation Checklist; other measures included the Strengths and Difficulties Questionnaire, Eyberg Child Behavior Inventory, Wechsler Intelligence Scale for Children, and NEPSY-II. Gender was not significantly correlated with EID, EU, ER, IQ, hyperactivity, or inhibitory control, nor was it significant in predicting disruptive behavior problems once these variables were controlled for (Duncombe et al., 2013). These results are unusual due to the lack of notable relation. Studies throughout this review have found or suggested gender differences in ER (see section on biological theory), hyperactivity, and inhibitory control (see section on surgency). Those studies that have failed to find gender differences in EID and EU, when assessed, have typically controlled for these factors as well as vocabulary. In this case, the lack of relation is best explained by two factors. First, the sample is imbalanced with respect to gender, having 138 males and only 53 females. Second, the assessments of emotion competencies are all self-report, despite the youth of the sample, and the measures of hyperactivity (Strengths and Difficulties Questionnaire) and inhibitory control (NEPSY-II Inhibition) are not intended as measures of temperament and therefore may have weaker construct validity than other measures.

A study of teenagers (mean age at Time 1: 13.68; 51% male) found significant gender differences in self-reported experience of sadness, fear, and happiness but no gender differences in ability to identify these or other emotions (Ciarrochi et al., 2008). Reports of emotion experience utilized the Positive and Negative Affect Schedule—Expanded Form, and EID was measured using the self-reported Toronto Alexithymia Scale, particularly a subtest that assesses difficulty identifying and describing emotions. Additionally, across genders, self-reported experience of sadness was negatively correlated with EID and reports of happiness were positively correlated with EID.

Finally, gender differences in identification of negative affect were found by Reeb-Sutherland and colleagues (2015), with teenaged males less likely to identify ambiguous facial expressions as sad or mad than females. The details of this study are described in the section above on effortful control and inhibition.

Together these studies demonstrate that gender differences in scores on assessment of EID are rare, particularly when controlling for other factors.

## Literature in Conclusion

**Biological and Social Factors Relating to EID Responses.** The review of literature demonstrates that numerous biological and social factors relate to EID. Biologically, people high in temperament-based inhibition are prone to identification of fear (Dodd et al., 2012; Reeb-Sutherland et al., 2015), children with bipolar disorder and severe mood dysregulation perform poorly at standard tasks of EID (Guyer et al., 2007), and those with autism spectrum disorder perform worse than non-ASD controls (Tanaka et al., 2012). There is no known effect of ADHD on structured measures of EID (Norvilitis et al., 2000). Socially, higher scores on EID measures are associated with

parent and teacher ratings of pro-sociality (Martin & Banerjee, 2013), a greater number of reciprocal friendships (Laghi et al., 2013; Roswell et al., 2014), and a greater belief in post-conflict reconciliation (Liao, Li, & Su, 2014). Additionally, higher scores on EID measures are associated with higher vocabulary scores, even when the EID tasks don't require verbalization (De Stasio et al., 2014; Karstad et al., 2015; Martins et al., 2016; Martin & Green, 2005).

**The Difference Between Accuracy and Patterns of Responding.** These relations only tell part of the story. Of 17 studies reviewed that assessed EID, 11 did so through assessment of accuracy, or children's scores on EID tasks, with no discussion of patterns of responding. The shortcoming of this can be described by example: imagine a test with four items, where for two, the correct answer is Scared and for two the correct answer is Angry. One child answers Scared to all four questions, another answers Angry to all four. These children would both have answered two questions correctly and two incorrectly, and would be given the same score. In 65% of the reviewed studies, these children would be said to have identical skill at emotion identification. Yet these children likely have differences in biology and experience, and will have different ways of interacting with their surrounding worlds. It is true that they are likely both high in negative emotionality, the temperamental tendency to demonstrate fear, anger, sadness, and distress (Bates, 1989; Else-Quest et al., 2006; Rothbart et al., 1994); however, the fear-biased child is more likely to be female (Denham & Couchoud, 1990; Else-Quest et al. 2006; Olino et al., 2013; Schirmer, 2013), predisposed to protect her young (Brody, 1985) while the anger-biased child is likely to be male (Kohnstamm, 1989), with higher circulation of dopamine and testosterone (Brody, 1985; Schirmer, 2013). If the anger-

biased child is male, parents may have reinforced the boy's tendency toward anger by using gender stereotypes when discussing emotions (van der Pol et al., 2015). If not, then an angry girl whose emotional expression is met with punitive or unsupportive parenting is particularly prone to depression (Sanders et al., 2013; Shortt et al., 2015). Therefore, though typical scoring of EID tasks can provide some information about whether a child will likely have difficulty with social and emotional development, analyses of patterns in response are more informative as to specific trajectory.

**The Role of Gender in EID Responses.** Patterns of response are particularly important in assessment of gender differences. Of the 17 studies in this review that assessed EID, 9 analyzed gender differences. Of those, only three looked at differences in patterns of responding rather than total score differences: Reeb-Sutherland et al. (2015), Cunningham et al. (2009), and Denham & Couchoud (1990). All three of these studies found gender differences in EID, while many of the studies that compared genders' accuracy did not. Literature from this review supports the hypothesis that genders would identify emotions differently. Meta-analysis has demonstrated a biological basis in gender differences, wherein girls overall are temperamentally more fearful and sociable and boys are generally more active (Else-Quest et al., 2006; Olino et al., 2013). Building on this, parents are known to reinforce gender stereotypes in experience and expression of emotion by using the label "boy" more often than "girl" when discussing anger and "girl" more often when discussing sadness and happiness (van der Pol et al., 2015). As a result, boys and girls may develop patterns of emotion identification where girls are more likely to detect and endorse fear and happiness and boys are more attentive to anger.

## The Contribution of the Present Study

By analyzing patterns of responding, one can achieve a greater sense of whether genders differ in their emotion identification than can be gleaned from analysis of EID scores alone. The purpose of the present study is to assess gender differences both in children's scores ("accuracy") and patterns of responding on a task of situational EID. Gender differences may be due to biological factors such as temperament, gender socialization, or both, known as gene-environment correlation (Beauchaine & Hinshaw, 2013). As age is associated with both increases in "accurate" EID (Denham & Couchoud, 1990; Herba & Phillips, 2004; van der Pol et al., 2015) and the unfolding of gene-environment correlations (Beauchaine & Hinshaw, 2013), the study also aims to examine how gender differences may relate to age.

Situational EID was assessed using a structured task from the Emotion Comprehension Test. In this measure, children are read 15 emotionally-salient scenarios about a gender-neutral puppet named Green. After each scenario, they are asked whether Green feels happy, sad, mad, scared, or no feeling. Children's responses on the task were analyzed using bivariate correlation, ANCOVA, and chi-square analyses.

**Hypotheses. Preliminary analyses.** In addition to several preliminary analyses to assess the reliability of measures used, whether assumptions for the chosen data analysis methods were met, and whether any noticeable patterns exist in the data that could influence statistical results, I assessed the role of vocabulary and age in EID scores in order to determine whether these factors should be controlled for in subsequent analyses of accuracy.

Vocabulary scores are positively correlated with EID scores in several studies of young children (De Stasio et al., 2014; Martin & Green, 2005; Martins et al., 2016; Karstad et al., 2015) and emotional vocabulary increases with age (Herba & Phillips, 2004). Therefore, preliminary analysis examined whether vocabulary scores correlate with EID scores and/or age. It was hypothesized based on prior research that vocabulary and EID scores would correlate positively and significantly; however, because vocabulary scores are standardized based on age, it was expected that there would not be significantly higher vocabulary scores amongst the older children than the younger.

Preliminary analysis also examined whether there are significant differences between younger and older participants' mean EID scores. This analysis was necessary to determine whether later analyses of accuracy may include age as an independent variable, in order to examine both gender's potential role in differences in accuracy and the interaction between gender and age. EID develops between 18 months and 9 years (Denham & Couchoud, 1990; Herba & Phillips, 2004; Southam-Gerow & Kendall, 2002; van der Pol et al., 2015). In the age range of the children in this study, ages 3 to 6, children improve in their ability to correctly identify emotions based on facial cues and particularly their ability to identify anger and fear (Denham & Couchoud, 1990; van der Pol et al., 2015). In the elementary years, children come to rely less exclusively on facial cues and more on situational cues for EID (Herba & Phillips, 2004). Therefore, it was expected that older children would have higher mean scores on a task of EID than younger children.

**Hypothesis 1: Girls are not "better" at EID than boys.** Of nine reviewed studies that analyzed gender differences, two found girls to have superior EID to boys:

Reeb-Sutherland (2015) found that females identified ambiguous faces more readily as sad or mad and Denham & Couchoud (1990) found that girls are better at naming fear when presented with drawings of facial expressions. No reviewed studies found gender differences in EID scores on tasks of situational EID. Though the majority of research has asserted no gender differences, popular belief endures that females are superior to males in emotion competence, including EID (see Donges, Kersting, & Suslow, 2012). Due to inconsistent results of former research and popular belief, this study examined whether girls have more "accurate" EID than boys, using the common methodology of comparing mean scores of males and females on a task of EID. Because few of the reviewed studies found gender differences in young children's EID scores, it was expected that the girls and boys in this sample would not differ in their mean EID scores. If vocabulary was found to be significant predictors of EID scores in preliminary analyses, it would be included as a covariate here in order to isolate the role of gender. If age was found to be a significant predictor of EID scores, it would be included as an independent variable so that its influence and the influence of the gender X age interaction could be assessed.

**Hypothesis 2: Boys respond with anger and girls respond with fear.** The popular beliefs that boys and girls differ in their experience and expression of emotion find some support in theory and research findings. Specifically, the results of the preceding literature review suggest that boys are biologically prone to express anger and girls are prone to express fear, and that these gender differences are reinforced by parents. According to biological theory, females may have developed responsiveness to fear because of its role signifying potential danger to offspring (Hyde, 2014) and may inhibit

inappropriate emotional responses, resulting in greater internalization (Schirmer, 2013). Males are believed to be responsive to and expressive of anger because it helps them maintain dominance (Brody, 1985). Research has found that boy toddlers express anger more frequently than girls (Kohnstamm, 1989), and that girls are better than boys at naming fear in childhood (Denham & Couchoud, 1990) and report experiencing more sadness and fear than boys in adolescence (Ciarrochi et al., 2008). Parents are more likely to use masculine nouns and pronouns when talking about anger (van der Pol et al., 2015) and report that girls are better at coping with anger than boys (Sanders et al., 2013). Based on this review of literature, it was expected that significant differences between boys and girls would be found in identification of anger and fear, with boys choosing anger as the appropriate emotional response more frequently than girls and girls choosing fear as the appropriate emotional response more frequently than boys. Failure to reject the null hypothesis, meaning no finding of differences between genders, may suggest that biology and gender socialization do not yield significant differences in how girls and boys, taken as collective groups, interpret emotionally-salient situations. However, limited age range of participants and low ambiguity of the stimulus situations may also constrict variability between genders.

**Hypothesis 3: Gender differences in response patterns are more notable among older children.** Though none of the reviewed studies assessed the relationship between gender differences in emotion competencies and age, several studies suggest the two variables may be related. First, general ability to identify anger and fear increases between ages 3 and 6 (Denham & Couchoud, 1990; van der Pol et al., 2015). As anger and fear are the emotions of concern in the presenting research's analysis of gender, it

was determined likely that should gender differences in response patterns be found, a gender and age interaction effect would be found as well. Second, though temperament begins to stabilize around age three (Olino et al., 2013), temperament's effect on emotion competencies is likely continuing throughout the ages included in this sample and for many years afterwards. By age three, parents are socializing children according to gender norms (van der Pol et al., 2015); however, as children age they are exposed to socialization from more people, including classmates and teachers. It was therefore hypothesized that any gender differences seen in hypothesis two would be larger amongst older children than their younger peers.

# Chapter 3: Research Methods

## Summary of Purpose

The aim of the present study is to investigate potential differences in boys' and girls' patterns of responding on a situational test of EID, the Emotion Comprehension Test (ECT). This is different from the method typically employed in studies of EID, in which scores are calculated based on children's accuracy of responding, meaning the frequency with which their chosen response matches the one determined by the test developers to be correct. This study examined whether there are gender differences in what emotions girls and boys believe are appropriate responses to emotionally-evocative situations. Further, this study demonstrates that these differences yield potentially useful information which is overlooked in traditional scoring of EID tasks (whereby item responses are simply counted as correct or incorrect).

## Design

The study uses quantitative data collected as a part of two studies investigating the relationship between self-regulation and social competence in preschoolers and kindergarten children respectively. Because the ECT and Vocabulary subtest of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III) are the only measures used in the present study, other measures from the larger study will not be reviewed.

## Procedures

**Participants.** The participants include 107 Pre-Kindergarten and 69 Kindergarten students attending private primary schools in a semi-urban area. Participants range in age from three to six years old, and are 48.3% male (n=85) and 51.7% female (n=91). No

children were reported to identify as gender nonconforming or have a biological sex that did not align with their gender identity. They are predominantly white: 47.2% are European-American or white, 11.9% African-American or black, 4% Hispanic-American or Latino, 11.9% Asian-American, 6.3% other, and 18.8% did not supply race demographics. SES demographics were only reported for 35.2% of participants, and were based on parents' educational attainment. Of those, 43.5% of parents had completed college but no post-graduate school, and 56.5% had completed post-graduate study. The rest of the families are expected to be of similar SES based on their children's enrollment in private kindergartens.

**Measures.** The Emotion Comprehension Test (ECT) is adapted from the Affect Knowledge Test (Denham, 1986) and Assessment of Children's Emotion Skills (ACES; Schultz et al., 2004). A complete review of adaptations made to the ECT and their rationale can be found in Gustafson (2009).

The ECT consists of three parts. In the first, Emotion Identification, participants are shown pictures of young children displaying emotional expressions and body language cues. In the second, Situations, participants are read emotionally-salient vignettes involving two preschool or early-elementary aged characters (for a list of example vignettes, see Appendix B). The vignettes are acted out for child using hand puppets. In the third, Behaviors, participants are read descriptions of characters' behaviors, which involve emotional cues (e.g. crying, skipping and whistling). The behaviors are acted out by the same puppets as in the Situations subtest; additionally, participants are shown five images of children displaying facial cues of emotion and told to point to the appropriate picture while naming how the character feels.

In all three parts, children are asked to identify whether each child is happy, sad, mad, scared, or exhibiting no feeling. In the directions of the task, it is explained to children that they should not say No Feeling when they are unsure of how the depicted child feels; instead they should guess what emotion the child is feeling. If children think there is more than one feeling, they should tell the examiner both. The examiner is instructed to follow up by asking which emotion the character feels more strongly and marking that emotion with an asterisk on the response record. The asterisked emotion is treated as the chosen emotion when the task is scored.

Full instructions for the Situations subtest are as follows:

> 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. 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.

It is notable that the puppets are referred to by the color of their shirt. The characters are not assigned genders at any point during the test, and items are administered and scored identically for male and female participants. This differs from other measures of EID, such as the TEC (Pons & Harris, 2000), which have different forms for boys and girls due to the belief that children will perform better if the characters in the scenarios are their same gender.

The correct response for each item was determined by a team of researchers and pilot tested on a group of adults. It was found that several items have two responses which were found equally correct, meaning that two response options were selected in equal proportions. In these cases, both options are given credit. In order to do so, a three-point scoring system was developed, based on of Denham's et al. (1994) scoring procedure, wherein correct answers are awarded three points, incorrect answers of the correct valence (e.g. a response of Mad when the correct answer is Sad) are awarded two points, and incorrect answers are awarded one point. Additionally, for four of the situations for which there was less consensus about the correct answer during development of the measure, children are given the chance to explain the rationale behind their selected emotion.

The Vocabulary subtest of the Wechsler Preschool and Primary Scale of Intelligence—Third Edition (WPPSI-III) assesses children's verbal comprehension by asking them to define increasingly difficult words. Though the fourth edition of the WPPSI was released in 2012, the third edition continued to be used in this study so that comparisons could be made between preschool and kindergarten samples.

**Data Collection.** The data are archival, and were collected between 2007 and 2015. Data collection occurred as follows: first, the researchers obtained consent to conduct research at a preschool and several elementary schools, primarily in the area surrounding Washington DC. Researchers spoke and disseminated consent forms to parents of potential participants during school open houses and back to school nights. The only basis for participant selection was age and parental permission. Researchers delivered WPPSI-III Vocabulary and the ECT, along with other measures not used in the

present study, during one of several 30-minute sessions with participants. Participant assent was obtained before each session.

Each child was assigned a case number, under which all their materials were stored and scored. A master sheet of names corresponding with case number is kept in a locked file cabinet for preschool data collection and password-protected spreadsheet for kindergarten data collection. The data collected was stored confidentially in locked file cabinets in the office of Dr. Teglasi, the primary investigator. Measures were scored by two independent graduate student researchers. They were then entered into EpiData, a double entry software program, by two independent graduate student researchers. Verified scores were transferred from EpiData into SPSS.

**Data Cleaning.** All relevant data were merged into a single SPSS file for analysis. Data were analyzed using SPSS Statistical Analyst Version 24 and Stata Version 13.1. Data from four kindergarten participants was removed due to a high number of missing responses on the Situations EID subtest. All remaining participants had one or fewer missing responses, resulting in a total of nine missing responses and nine corresponding missing scores. Eight of the missing responses were from kindergarten participants. Missing values for responses were not imputed because inaccurate estimation of children's responses could impact whether or not hypotheses about children's response patterns were supported. However, missing values for scores were imputed so that each participant had the same range of possible values for mean and total score.

Participants were grouped by gender for chi-square analyses, yielding a sum of each emotion option for each gender (i.e. altogether, boys in the study chose Mad **x**

times). These analyses address the hypothesis that significant differences between boys and girls are found primarily in identification of Fear and Anger, with girls answering Scared more frequently than boys and boys answering Mad more frequently than girls. However, because children's accuracy on EID tasks (EID scores) increases with age and is expected to do so in this sample, it was predicted that older children's patterns of responding would be different from younger children's patterns of responding. Younger children, for example, might be expected to make more "mistakes," choosing the "incorrect" emotional response for a situation. Because there are several possible incorrect responses and only one correct response, this would be expected to result in more variable patterns of responding among younger than older children. Such variance may complicate observed gender differences in patterns of responding. Further, as gender socialization and effects of temperament increase with age, differences in how girls and boys identify emotions are expected to grow. Younger girls and boys, exposed to lower levels of gender socialization and with not-yet-stable temperaments, may have fairly similar patterns of responding, while older children would have the gender-stereotyped differences of boys identifying more anger and girls identifying more fear predicted by the literature. Therefore, the chi-square analyses were conducted separately for younger and older children in order to examine whether differences in girls' and boys' response patterns differ between younger and older samples. It was hypothesized that any gender differences seen in distribution of responses would be larger amongst older children than their younger peers.

# Chapter 4: Results

## Preliminary Analysis

Preliminary analysis assessed the reliability of measures used; whether assumptions for the chosen data analysis methods were met; and whether any noticeable patterns exist in the data that could influence statistical results, for example whether any children were outliers in responding, and whether the range of Situations EID scores differed between genders. Given literature's findings that psychopathology relates to difficulty with EID (Guyer et al., 2007; Norvilitis et al., 2000; Rieffe & DeRooij, 2012; Tanaka et al., 2012), particular attention was paid to participants whose scores and/or patterns of responding suggest difficulty with EID (e.g. low Situations EID scores; saying the puppet character, Green, feels sad much more often than is typical). Further preliminary analysis utilized Pearson's and Spearman's correlations to assess the strength of association between 1) vocabulary and Situations EID scores 2) vocabulary scores and age and 3) age and Situations EID scores.

**Internal Consistency Reliability.** Internal consistency was established for the EID measure, the ECT Situations **s**ubtest, using Cronbach's alpha. The internal consistency for the subtest was .77, which is acceptable. Inter-item reliability for the WPPSI-III vocabulary subtest was not assessed, as single item scores were not entered for each participant, but the measure's manual reports it to have a Cronbach's alpha of at least .86 for all ages.

**Examination of Assumptions for Correlations.** Pearson's correlation assumes that data are on an interval or ratio scale, that the relationship between the two variables is linear (linearity), that the distributions of the two variables are normal (normality), that

the variance in scores for one variable is equal at all values of the other (homoscedasticity), and that there are no outliers. Spearman's correlation assumes that data are on an ordinal, interval, or ratio scale; have a monotonic relationship (the variables increase together or decrease together, but the relationship does not have to be linear); and are normally distributed. These assumptions were checked for the three conducted correlations: the correlation between vocabulary scores and EID scores (Pearson's correlation), between vocabulary scores and age grouping (Spearman's correlation), and between age grouping and EID scores (Spearman's correlation).

**Vocabulary and EID scores.** Vocabulary scores and Situations EID scores are both on interval scales, with vocabulary scores falling between 1 and 19, and EID scores between 15 and 45. The relationship between vocabulary scores and Situations EID scores was assessed for linearity using a scatter plot. It was found that the variables had an observable positive linear relationship to one another. The assumption of normality was assessed using the Shapiro-Wilk statistic, for which a non-significant result indicates normality. The Shapiro-Wilk statistic for the WPPSI-III vocabulary scores was not significant at the .05 level, demonstrating that the distribution of scores is normal (skew=-.26, $p=.52$). According to the Shapiro-Wilk test, the distribution of Situations EID scores was not normal ($p<.001$). A histogram and Normal Q-Q Plot of the Situations EID scores reveals a skew of -1.64, meaning that scores were concentrated at the high end of possible values with a few much lower values. Homoscedasticity was assessed using a graph relating vocabulary scores to Situations EID scores. The graph indicated that variance in the distribution of Situations EID score around the best-fit line decreases slightly when vocabulary scores increased, potentially indicating heteroscedasticity. Box

plots were used to depict the distribution of vocabulary and Situations EID scores for all participants. The range of vocabulary scores was from 4 to 18, with a mean of 11.77 and a median of 12. No participants had outlying vocabulary scores. Outliers are defined by Tebila's convention as scores that fall below the 25$^{th}$ percentile or above the 75$^{th}$ percentile by 1.5 times the interquartile range.

Situations EID scores range from 15 to 44, with a mean of 36.31(SD=5.16) and median of 38. The data set contains eight outliers (described below), whose scores range from 15 to 29. This demonstrates that outliers are likely the cause of Situations EID scores' non-normal distribution. Because there were similar numbers of boy and girl outliers, they are likely to have minimal effect on the outcome of gender analysis; however, there were more outliers amongst younger children than older, suggesting that younger children may struggle more with identifying the "correct" emotion more than older children. This is consistent with their mean scores on the task, which were 35.14 for younger children and 37.89 for older children, and with previous findings. Despite their potential effect on the normality of the sample data, outliers were not removed from the data set because the goal of analysis was to better understand variability in children's patterns of responding, and outliers are a critical component of this variability.

**Vocabulary scores and age.** Though age is typically a ratio scale, for the purposes of this study, children's ages were dichotomized into a younger and older group based on their age in months. This yielded an ordinal scale variable. The relationship between vocabulary scores and age was assessed for a monotonic relationship using two scatter plots. The first assessed the relationship between vocabulary scores and children's placement in each of the two age groups. It was apparent that the range of vocabulary

scores for children in group two (older children) was slightly lower than the scores for younger children. The second scatter plot assessed the relationship between vocabulary scores and age in months. There was no discernable relationship, linear or otherwise, between the two variables. The assumption of normality was assessed using the Shapiro-Wilk statistic. As stated above, this statistic found that the distribution of vocabulary scores for the sample is normal (skew=-.26, p=.52). The distribution of age groups could not be tested for normality because it is a dichotomous variable; however, the distribution of age in months was found not to be normal (skew=-.42, p<.001). A box plot was used to depict the distribution of children's ages. The mean age was 61.56 months (SD=10.57) and median was 64 months, with a range from 38 to 82 months. There were no children whose age made them an outlier according to Tebila's convention (described above).

**Age and EID scores.** The relationship between age and Situations EID scores was assessed for linearity using two scatter plots. The first assessed the relationship between Situations EID scores and children's placement in each of the two age groups. Because the age groups are a dichotomous variable, their relationship to Situations EID scores is displayed graphically by two vertical lines. It was apparent that the range of Situations EID scores for children in group two (older children) was slightly higher than the scores for younger children. Measures of central tendency reveal that the mean Situations EID score for younger children is 35.14(SD=5.69) and the mean for older children is 37.89(SD=3.65). The second scatter plot assessed the relationship between Situations EID scores and age in months. There was a slight positive linear relationship between the two variables. It was previously established that the distribution of Situations EID scores was negatively skewed (skew= -1.64, p<.001) and that the distribution of ages

in months was also negatively skewed (skew=-.42, p<.001), meaning that there was more variation in ages of younger children than older. As previously stated, there were no outliers in the age variable; however, there were several outliers by EID score.

**Correlations. Correlation of vocabulary and EID scores.** Pearson's correlation was used to test the hypothesis that vocabulary and Situations EID scores are significantly positively correlated, such that higher vocabulary scores would be associated with higher Situations EID scores. This hypothesis was supported, with the two variables having a moderate positive correlation (r=.44, n=139, p<.001). Because this hypothesis was supported, vocabulary scores were included as a covariate in a later analysis of covariance to isolate effects of gender on Situations EID scores and response patterns. However, as stated above, Situations EID scores were non-normal, heteroscedastic, and had several outliers. Therefore, there is a possibility that the significance of this correlation is overstated.

**Correlation of vocabulary scores and age.** Spearman's correlation was used to test the hypothesis that older children would not have significantly higher mean vocabulary scores, as vocabulary scores are standardized based on age. In order to assess the relationship between age and both vocabulary and mean Situations EID scores, the sample was dichotomized by age (older v younger participants). Though this dichotomization largely reflected the preschool and kindergarten students, it allowed for the age by gender subgroups to be more equal in size. The correlation was not significant (r=-.06, n=139, p=.45), and therefore the null hypothesis that participants of different ages would have equal mean vocabulary scores was not rejected. The result was verified by a Pearson's correlation of vocabulary scores and participants' ages in months (r=.01,

n=139, p=.88). These results indicated that vocabulary scores could be controlled for without obscuring the effects of age.

**Correlation of age and EID scores.** A second Spearman's correlation was used to assess whether the current sample confirms prior research's findings that Situations EID scores increase with age and to determine whether age should be included as a covariate in analysis of the relationship between EID scores and gender so that the impact of gender may be isolated. It was hypothesized that older students would have significantly more accurate Situations EID than younger students, meaning that their mean score on Situations EID would be significantly higher than younger students' mean score. The Spearman's correlation found a weak positive relationship between the two variables (r=.21, n=174, p<.01), supporting this hypothesis (Table 2). This result was verified by Pearson's correlation of age in months and Situations EID scores (r=.39, n=174, p=<.001). Therefore, age will be included as a covariate in a later analysis of covariance of gender differences in EID score. However, as stated above, Situations EID scores were non- normal and had several outliers. There is therefore a possibility that the significance of this correlation is overstated.

Table 2. Correlations

| | | Age Group | Age in Months | Vocabulary Scaled Score[a] | EID Total Score[b] |
|---|---|---|---|---|---|
| Age Group | Spearman Corr. | 1 | .87** | -.06 | .21** |
| | Sig. | | <.001 | .53 | .01 |
| Age in Months | Pearson Corr. | | 1 | .01 | .39** |
| | Sig. | | | .88 | <.001 |
| Vocabulary Score | Pearson Corr. | | | 1 | .44** |
| | Sig. | | | | .00 |
| EID Total Score | Pearson Corr. | | | . | 1 |
| | Sig. | | | | |

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
a. N=139
b. N=174

**Examination of Range and Unusual Patterns of Responding.** As stated above, the range of EID scores was from 15 to 44, with a mean of 36.31(SD=5.16) and median of 38. The range for girls was 19 to 43 and the range for boys was 15 to 44. The range for younger children was 15 to 42, and the range for older children was 23 to 44. Outliers were identified as participants with Situations EID scores 1.5 times the interquartile range below the 25$^{th}$ percentile. Separating children by age group, the interquartile range for younger children is 33 to 39 and the interquartile range for older children is 36 to 40. Because the maximum possible score was 45, it was impossible for scores to be upper-end outliers for either sample. Lower-end outliers are defined as younger children with scores below 24 (1.5*IQR below the 25$^{th}$ percentile) and older children with scores below 30.

There are six younger children and two older children whose scores make them lower-end outliers (Table 3). Situations EID score outliers were slightly more common amongst girls than boys. They were not removed from the data set because their presence

was determined necessary to understanding variability of children's patterns of responding.

Table 3. Response frequencies and scores for outlier participants by score

| Participant | Age Group | Gender | Situations EID Score |
|---|---|---|---|
| 1 | Younger | Girl | 21 |
| 18 | Younger | Girl | 23 |
| 29 | Younger | Girl | 19 |
| 30 | Younger | Girl | 21 |
| 75 | Older | Boy | 29 |
| 94 | Younger | Boy | 15 |
| 141 | Younger | Boy | 20 |
| 144 | Older | Girl | 26 |

Additionally, the data set was examined to identify typical patterns of responding for the sample as a whole and any participants whose pattern of responding was atypical (Appendix C). This was done using a similar outlier procedure to that described above. The interquartile ranges for response frequency of each emotion was identified, and children who fell more than 1.5 interquartile ranges below the 25$^{th}$ or above the 75$^{th}$ percentile in response frequency. Using this procedure, it was first apparent that the modal frequency of responses was often different from the frequency with which each emotion is considered "correct" according to task scoring. For example, though Mad is considered a correct response six times, few children chose it with that frequency and instead 60 (34.7%) children chose Mad zero times.

The patterns of responding and EID Situations scores of the most extreme responders are listed in Table 4 (See Appendix B and C for more information about items and their "correct" responses). Many responders were both extreme under-responders of certain emotions and over-responders of others. For example, one boy said Happy 0 times and Sad 15 times. Overall, all but one of the children with unusual response frequencies

were in the younger age group, and girls were slightly more likely to give unusual response patterns (by this definition) than boys. Comparison of the table summarizing children who had unusually high response frequencies for a given emotion (Table 4) to the table summarizing children whose Situations EID scores were outliers (Table 3) demonstrates that children in the sample could have a highly unusual pattern of responding without being flagged as having poor EID based on their Situations subtest score.

Table 4. Response frequencies and scores for outlier participants by response pattern [a]

| Participant | Age Group | Gender | Freq. Happy | Freq. Sad | Freq. Mad | Freq. Scared | Freq. No Feeling | Situations EID Score |
|---|---|---|---|---|---|---|---|---|
| 1 | Younger | Girl | **15** | **0** | 0 | 0 | 0 | **21** |
| 3 | Younger | Boy | 5 | **0** | 9 | 1 | 0 | 34 |
| 5 | Older | Boy | **0** | **15** | 0 | 0 | 0 | 33 |
| 13 | Younger | Girl | 4 | **0** | **11** | 0 | 0 | 37 |
| 30 | Younger | Girl | **0** | 5 | 2 | 0 | 8 | **21** |
| 46 | Younger | Girl | **0** | **12** | 0 | 2 | 1 | 31 |
| 57 | Younger | Girl | **0** | 6 | 5 | 3 | 1 | 36 |
| 60 | Younger | Girl | **0** | 6 | 2 | 1 | 6 | 28 |
| 94 | Younger | Boy | **0** | **0** | 0 | 0 | **15** | **15** |
| 126 | Younger | Boy | **0** | **0** | 2 | 5 | **8** | 25 |
| 138 | Younger | Boy | 3 | 2 | 0 | **10** | 0 | 35 |

[a] Bold type indicates the response frequency or score is an outlier.
Note. Happy is a correct response 3 times, Sad 6 times, Mad 6 times, Scared 5 times, and No Feeling 0 times.

## ANCOVA

An Analysis of Covariance (ANCOVA) was used to assess accuracy of EID responding using differences between group means based on gender. The ANCOVA compares girls' and boys' Situations EID scores. Because none of the reviewed literature found significant gender differences in overall EID scores (see Appendix A), it was hypothesized that girls will not be significantly better at EID than boys, meaning that their mean score on Situations EID would not be significantly higher than boys' mean score. Because age and vocabulary were found to be significantly related to Situations EID scores, vocabulary was included as a covariate in this analysis and age was included as a second independent factor in order to better understand the relationship between gender and EID scores.

**Examination of Assumptions for ANCOVA.** ANCOVAs, like all ANOVAs, assume residual normality and homoscedasticity, as well as independence of cases for the dependent variable. These assumptions were checked for girls' and boys' EID scores. The distribution of residuals for Situations EID scores was non-normal according to the Shapiro-Wilk statistic ($p<.01$). The residuals are negatively skewed (skew=-1.29). However, ANCOVA is robust to the normality assumption, meaning that non-normality does not typically impact results in a large sample. Homoscedasticity was assessed using the Breusch-Pagan/Cook-Weisberg test, which indicated that the residuals were heteroscedastic ($\chi^2=56.11$, $p<.001$). The plot of scores and score residuals showed some heteroscedasticity due to the low-score outliers. This pattern did not differ for boys and girls. Because each EID score came from a different participant, independence can be

assumed. Violations of the independence assumption generally increase standard errors and associated p-values of hypothesis tests.

**Results.** The ANCOVA results assessing whether girls' and boys' Situations EID scores are significantly different supported the hypothesis. After adjusting for vocabulary scores, girls' and boys' Situations EID scores did not differ significantly (F (1, 134) =.65, p=.42, partial eta squared=.005). Gender explains only .5% of variance in EID scores. However, older and younger participants' Situations EID scores did differ significantly (F(1, 134)=13.2, p<.001). Age group explains 9% of the variance in EID scores. There was no interaction between age and gender (F(1, 134)=.51, p=.47). The adjusted means were 37.34 for girls and 36.77 for boys, compared to unadjusted means of 36.33 and 36.45 respectively.

Table 5. ANCOVA of Situations EID scores by gender and age

| Source | df | Mean Square | F | Sig. | Partial Eta Squared | Observed Power |
|---|---|---|---|---|---|---|
| Corrected Model | 4 | 208.82 | 12.51 | .00 | .27 | 1.00 |
| Intercept | 1 | 5320.58 | 318.79 | .00 | .70 | 1.00 |
| WPPSI Vocab Score | 1 | 624.69 | 37.43 | .00 | .22 | 1.00 |
| Gender | 1 | 10.88 | .65 | .42 | .005 | .13 |
| Age Group | 1 | 220.32 | 13.20 | .00 | .09 | .95 |
| Gender * Age Group | 1 | 8.58 | .51 | .47 | .004 | .11 |
| Error | 134 | 16.69 | | | | |
| Total | 139 | | | | | |
| Corrected Total | 138 | | | | | |

This result was verified using a second ANCOVA where children's age in months, rather than age groups, was used as a covariate. Vocabulary remained a covariate and gender the independent variable. After adjusting for age in months and vocabulary scores, girls' and boys' Situations EID scores did not differ significantly (F (1, 134) =1.35, p=.25, partial eta squared=.016). Gender explained only 1.6% of variance in EID scores in this

model, which was consistent with the previous result. The adjusted means were 37.52 for girls and 37.13 for boys.

## Chi-square Analyses

Pearson's chi-square tests of independence were used to assess distribution of frequencies by which each of the five emotion options (happy, sad, mad, scared, no feeling) were chosen on the Situations subtest of the ECT. A total of five chi-square analyses were conducted, one for each of the correct response options and one for the measure as a whole (No Feeling was never a correct response). Examining clusters of items as well as the measure as a whole yields a more nuanced understanding of how and when girls' and boys' patterns of EID differs, if at all.

**Examination of Assumptions for Chi-Square Analysis of Independence.** A chi-square analysis of independence has two assumptions: first that the sample size is sufficient for cells to have expected values greater than five (i.e. five children gave the answer Sad) and second that data points are independent. Expected value is the number of times each response is expected to be chosen if boys' and girls' response patterns are identical. It is calculated based on the total number of responses for each gender as well as the total number of responses for each emotion. Because there are at least 38 participants in each group (separated by age and gender), at least three items in each analysis, and five possible item responses, each cell would have an expected value of 22.8 if all responses were equally likely to be chosen. In actuality, some emotions were chosen much less frequently than others. The results of chi-square analyses presented below indicate that the expected values for some of the less-frequently chosen emotions were below five; however, according to Yates, Moore, and McCabe (1999) this is

acceptable in chi-square analyses larger than 2 X 2 provided that at least 80% of the expected counts are greater than five.

One hundred percent of expected values exceeded five for seven of the ten analyses. For the analysis of younger children's responses to all items, 80% of expected values exceeded five, for the analysis of younger children's responses to items where the correct answer was Happy, 70% of expected values exceeded five, and for the analysis of older children's responses to items where the correct answer was Happy, 40% of expected values exceeded five. This indicates that results of the chi square analyses pertaining to Happy items should be interpreted with caution.

Additionally, in order to increase cell counts, items were grouped by correct response (i.e. all items where the correct response was Happy were analyzed simultaneously) rather than individually. This results in more than one observation coming from each participant, which violates the assumption of independence. Because of this, the effective sample size may in fact be smaller than the reported sample size due to intra-individual correlations in responses.

**Results.**

**Full Measure.** The first set of two-by-five chi-square tests of independence compared girls' and boys' patterns of responding on the full measure (all 15 items in combination). The data set was split into younger and older children, and responses were compared by gender. The chi-square test of independence for the full measure found no relationship between gender and the distribution of responses among either younger ($\chi_4^2$=6.88, p=.14) or older ($\chi_4^2$=1.59, p=.81) children. The relationship was approaching significance at the .1 level for younger children, however, which is contrary to the

hypothesis that the relationship between gender and distribution of responses would be larger amongst older children than younger ones. When younger and older participants were grouped together, the gender difference in patterns of responding remained insignificant ($\chi^2_4$=2.41, p=.66).

**Items Where Happy was the Correct Response.** The second set of two-by-five chi-square tests of independence compared girls' and boys' patterns of responding on Situations items where Happy was the correct, or 3-point, response. This includes items 2, 9, and 15. The analysis was conducted separately for younger and older children. The chi-square test of independence for younger children found no relationship between gender and the distribution of responses ($\chi^2_4$=1.914, p=.751). However, the chi-square test for older children did find a significant relationship ($\chi^2_3$=7.96, p=.047). Calculation of standardized residuals revealed that older boys chose Sad more frequently than would be expected were their response patterns equal to girls, and No Feeling less often than expected. Though these gender differences were not accounted for in hypotheses based on the review of the literature, these results do align with the hypothesis that the relationship between gender and the distribution of responses would be stronger amongst older children than younger children.

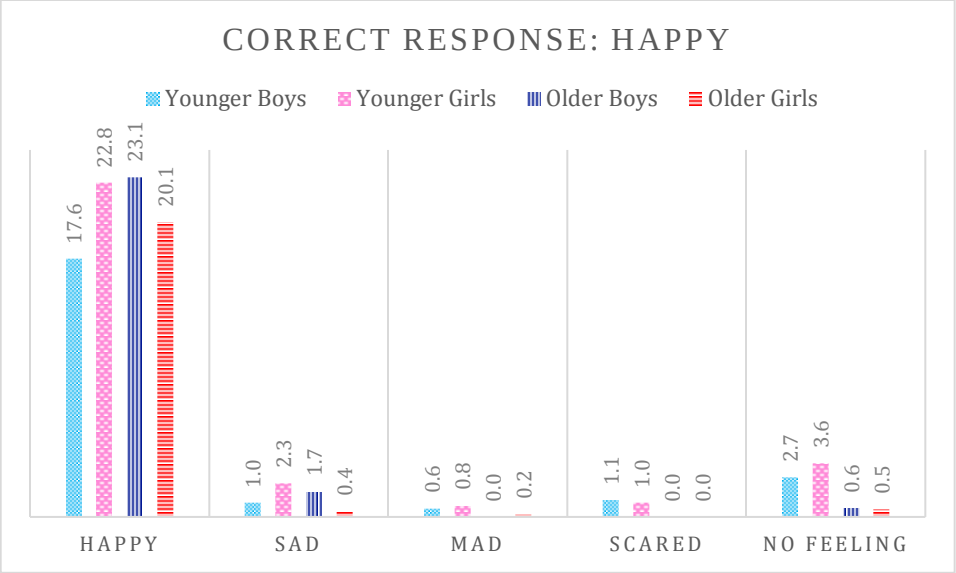


Figure 2. Percentages of children choosing each response on items where the correct response is Happy. All children together add up to 100%.

**Items Where Sad was the Correct Response.** The third set of two-by-five chi-square tests of independence compared girls' and boys' patterns of responding on Situations items where Sad was the correct, or 3-point, response. This includes items 1, 3, 6, 10, 11, and 12. The analysis was conducted separately for younger and older children. The chi-square test of independence for younger children found a significant relationship between gender and the distribution of responses ($\chi^2_4$=13.87, p=.008). Calculation of standardized residuals revealed that younger boys chose Scared more frequently than expected, and younger girls chose Scared less frequently than would be expected, were the genders' distributions of responses equal. However, the chi-square test for older children did not find a significant relationship ($\chi^2_4$=.78, p=.94).

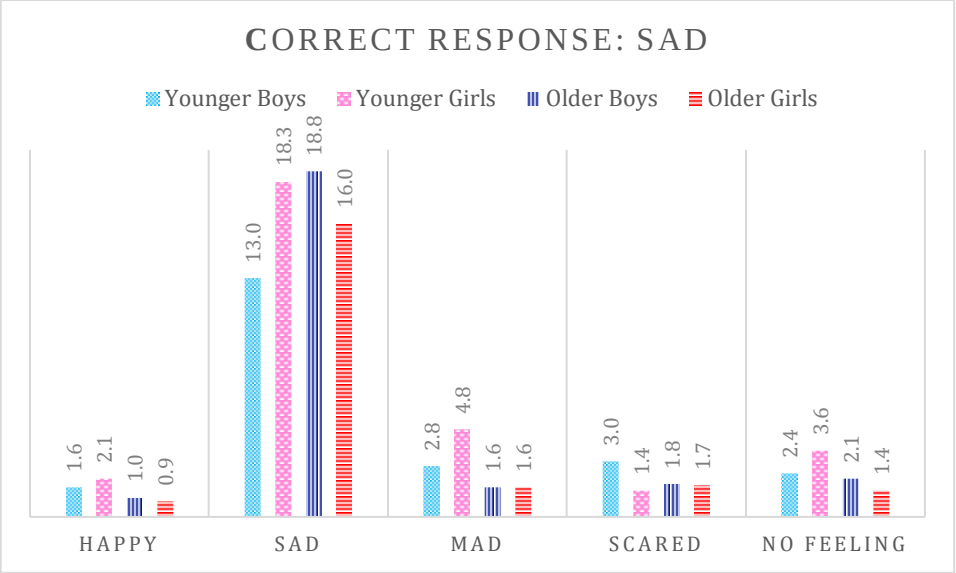


Figure 3. Percentage of children choosing each response on items where the correct response is Sad.

**Items Where Mad was the Correct Response.** The fourth set of chi-square tests of independence compared girls' and boys' patterns of responding on Situations items where Mad was the correct, or 3-point, response. This includes items 1, 5, 6, 7, 13, and 14. Note that two of these items are also counted as correct for the response Sad. The analysis was conducted separately for younger and older children. Contrary to hypothesis, the chi-square test of independence found no relationship between gender and the distribution of responses for either younger ($\chi^2_4$=2.69, p=.61) or older ($\chi^2_4$=1.84, p=.76) children.

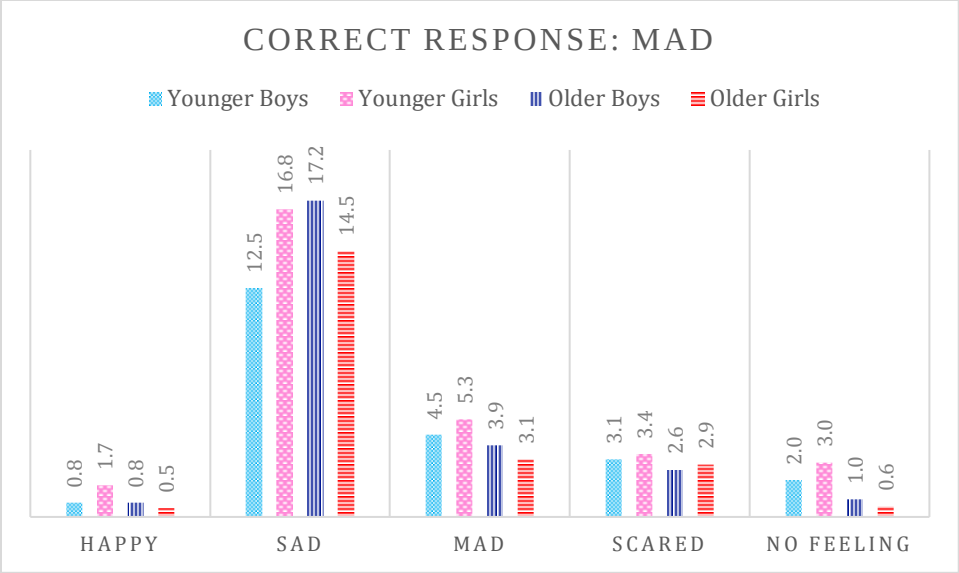


Figure 4. Percentage of children choosing each response on items where the correct response is Mad.

**Items Where Scared was the Correct Response**. The fifth set of chi-square tests of independence compared girls' and boys' patterns of responding on Situations items where Scared was the correct, or 3-point, response. This includes items 4, 8, 11, 12, and 14. Note that one of these items is also counted as correct for the response Mad and two items are counted as correct for the response Sad. The analysis was conducted separately for younger and older children. Contrary to hypothesis, the chi-square test of independence found no relationship between gender and the distribution of responses for either younger ($\chi^2_4$=5.61, p=.23) or older ($\chi^2_4$=4.51, p=.34) children.

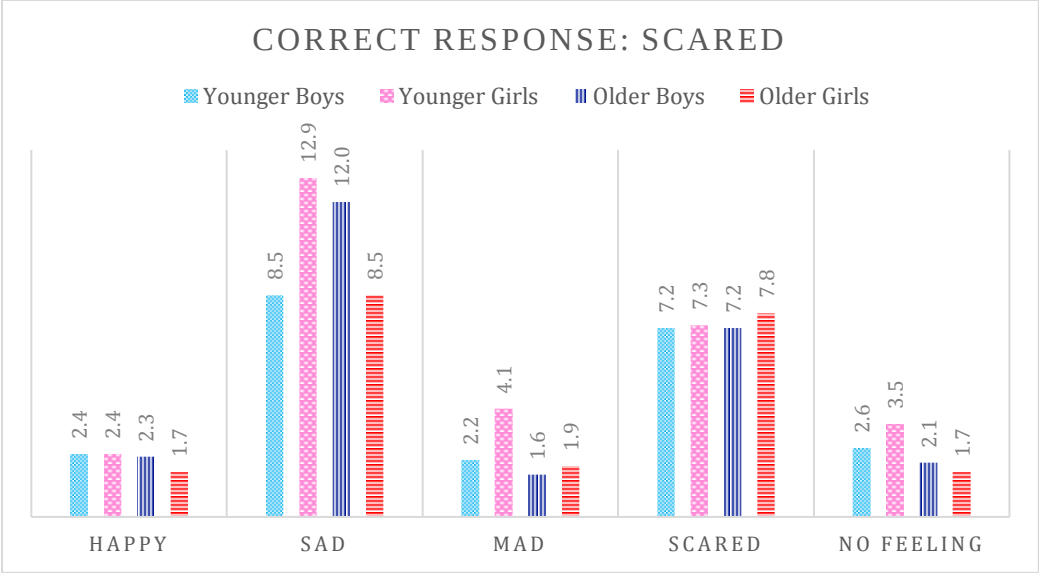


Figure 5. Percentage of children choosing each response on items where the correct response is Scared.

**Follow-up Analyses**

**Item Analysis.** For clarification, chi-square tests of independence were conducted for each item to examine whether significantly different patterns in responding occurred for age groups or genders. Significant effects due to age were found on five items (Appendix D). : Contrarily, no item demonstrated significant effects due to gender, though one item demonstrated effects that approached significance (Item 11: $\chi^2_4$=8.54, p=.07). The specific pattern seen in this item is contrary to the hypothesis: girls chose Mad more often than boys, whereas boys chose Scared more often than girls. (Appendix E) The data set was then analyzed by age group and gender simultaneously to reveal that significant differences in patterns of responding on item 11 existed for younger children ($\chi^2_4$=12.00, p=.017) but not older children ($\chi^2_4$=3.90, p=.42). The "correct" responses for this item were Sad and Scared.

**Performance on a Task of Facial EID.** Children's patterns of responding to Situations EID was compared to patterns of responding to a task of facial EID. For several items on the Situations subtest, the most common answer among younger and older children was not the response considered by adult task developers to be correct. Therefore, children's patterns of responding were assessed using a task of facial EID which had been given at the same time as Situations EID in order to determine whether children's unexpected patterns of responding were influenced by the type of task. Comparison of the percentage of children choosing the "correct" answer on each task demonstrates that children chose the "correct response" considerably more on the facial EID task than Situations EID and that children did not demonstrate the same under-identification of Anger and Fear on the facial task as they did on Situations (Figure 6).

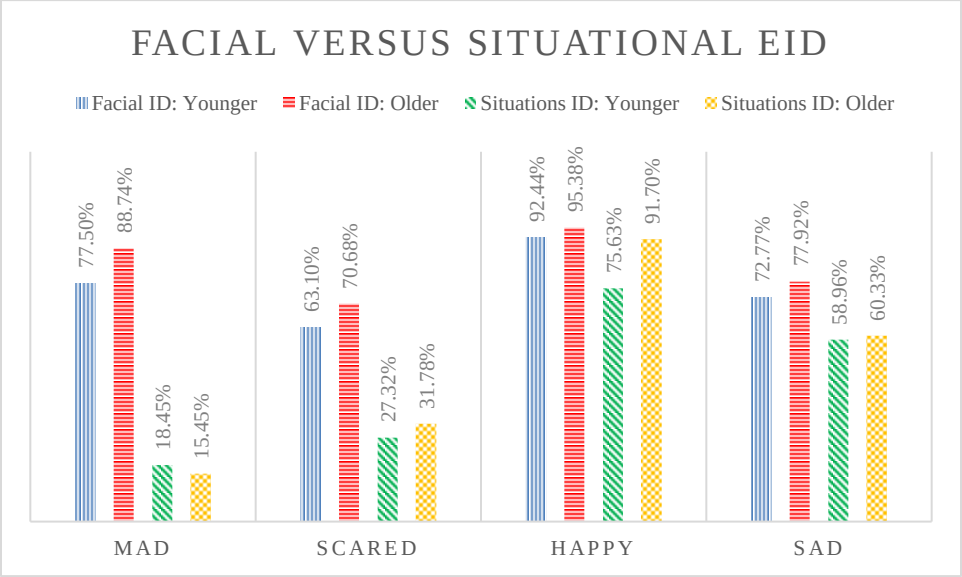


Figure 6. Percentage of children choosing the "correct" response on facial EID and Situations EID.

# Chapter 5: Discussion

Scientific literature and popular opinion alike have long claimed that girls are superior to boys at EID and related competencies, including emotion regulation and understanding. This belief rises from differences in temperamental and physiological factors, thought to be based in women's evolutionary need to protect themselves and their young, as well as social factors, like display rules about what emotions are appropriate for each gender to express (Brody, 1985; Cunningham et al., 2009; Denham & Couchoud, 1990; Herba & Phillips, 2004; Hyde, 2014).; Reeb-Sutherland, 2015). This study aimed to investigate gender differences in emotion understanding using both the traditional method of comparing scores on a structured task of EID ("accuracy") and a comparison of girls' and boys' response patterns (endorsement of particular emotions). It was believed that analysis of boys' and girls' response patterns yields more valuable information about the development of children's emotional competencies than simple tallies of accuracy. As age is associated with both increases in "accurate" EID (Denham & Couchoud, 1990; Herba & Phillips, 2004; van der Pol et al., 2015) and the unfolding of gene-environment correlations (Beauchaine & Hinshaw, 2013), the study also aimed to examine how gender differences may relate to age-related changes during pre-kindergarten and kindergarten.

## Gender Differences

Results supported the hypothesis that boys' and girls' scores on the Situations subtest of the ECT would not differ significantly. This finding is similar to those of Duncombe et al. (2013) Karstad et al. (2015), and Martin and Green (2005) and contrary to conventional belief that girls are better at understanding emotions than boys. However,

results largely did not support the hypotheses that gender differences in patterns of responding would be found in the areas of anger and fear, and would be more notable amongst older than younger children. According to both chi-square tests of independence and post-hoc t-tests, boys did not choose anger as the appropriate emotion more frequently than did girls, and girls did not choose fear as the appropriate emotion more frequently than did boys. Instead, amongst the older group of children, *boys* chose Sad more frequently than girls in response to items where Happy was meant to be the "correct" answer; and amongst the younger group of children, boys chose Scared more frequently than girls in response to items where Sad was meant to be the "correct" answer. Additionally, amongst older children, boys chose No Feeling less frequently than did girls in response to items where Happy was meant to be the "correct" answer. These differences were not predicted, and they are less supported by the reviewed literature than the hypothesized differences.

The result that boys believed Sad and Scared to be an appropriate situational response more frequently than girls did, particularly on items with a positive valence (items where Happy is the "correct" response), is unusual given the evidence that girls are higher in negative emotionality than boys (Beauchaine & Hinshaw, 2013; Olino et al., 2013). Boys' responses on items where Happy is the "correct" response could lend support to the belief that boys are less accurate in EID than girls, even if their scores on EID measures are not significantly different from one another.

On items where the "correct" response was Sad, boys may have answered Scared with a higher frequency than girls because the possible consequences of the situation were more salient to them. One item which demonstrates this difference is number three,

which states, “Green always took care of the family’s kitten. Green really loves this kitten. But the kitten is gone and won’t come back. How do you think Green feels: happy, sad, mad, scared, or no feeling?” Children’s previous experiences are known to shape the schemas they use to interpret situations such as those presented on the Situations EID subtest. Boys’ higher rates of externalizing behaviors (Schirmer, 2013) and impulsivity (Else-Quest et al., 2006) lead them to be disciplined more frequently than girls (Owens, 2016), and therefore discipline is likely a stronger influencer of their schemas. If this is taken to impact their pattern of responding, then in answering a question such the one presented above, boys may have been more likely to consider that Green might have done something irresponsible that lead to the kitten running away, and might therefore get punished. This would cause them to answer Scared rather than the “correct” answer of Sad. In the present sample, 8.4% of boys answered Scared to the about Green’s kitten, while only 6.7% of girls did so, suggesting that this is the case.

The findings pertaining to gender differences in interpretation of happiness should be taken with caution. They are likely impacted by one outlier, an older boy who answered Sad to all items; his responses contribute to the observed gender difference in frequency of answering Sad. Additionally, for this analysis, only 40% of expected values exceeded five, whereas at least 80% should have exceeded this number. This violates the assumptions of the chi-square test; therefore, additional analysis with larger group sizes may be needed to better assess consistencies and inconsistencies in gender differences in patterns of responding.

## Age Differences and Similarities

Results did not lend consistent support to the hypothesis that gender differences would be greater among older children than younger: gender differences in selection of Happy were seen among older but not younger children, while differences in selection of Sad were seen in younger but not older children. However, these results do not mean that age plays a trivial role in EID. Instead, age was seen to be influential in both children's scores and patterns of responding: in the AVCOVA assessing gender differences in Situations EID scores, age was seen to be more influential in predicting EID scores than was gender, and in follow-up analyses, significant effects due to age were found on five items of the Situations EID subtest while significant effects due to gender were not seen on any items. So why are more age differences not apparent in the chi-square analyses?

It is possible that age is in fact such a significant factor that it is obscuring all other possible results. The hypotheses for this study were based on reported findings that children's ability to correctly identify emotions improves between ages two and four (Denham & Couchoud, 1990), with ability to identify happiness and sadness occurring before their ability to identify anger and fear (van der Pol et al., 2015). However, this literature relied on facial EID tasks. A review by Herba and Phillips (2014) found that three to five year old children rely almost exclusively on facial cues for EID, and that situational cues are not meaningfully considered until children are eight to nine years of age. This would suggest that all of the children in the present study were too young to use situational cues to determine a character's emotions. Three factors from the results support this hypothesis.

First, several younger children of both genders were outliers in patterns of responding. It is possible that these outliers yielded intra-group variation in emotion identification that overshadowed inter-group variation. Second, the predominant response on all items pulling for negative valence (meaning items where Sad, Mad, or Scared was the correct answer) amongst both genders and both age groups was Sad. Sad was in fact a more frequent response than the "correct" response on items pulling for identification of anger and fear. This suggests that the children had been able to tell that a situation had a negative valence but may not have understood the specific situational cues that differentiated fear-, anger-, and sadness-evoking situations from one another. This is in concordance with the Denham & Couchoud's (1990) finding that children's "errors" in EID often involve confusion of negative emotions. Third, children in this study were able to differentiate between sad, angry, and scared faces. On a task of facial EID given at the same time as Situations, an average of 77.5% of younger children and 88.74% of older children identified Mad when it was meant to be the correct response. This contrasts with 18.45% of younger children and 15.45% of older children identifying Mad when it was meant to be the correct response on the measure of situational EID. Likewise, on the facial task of EID, an average of 63.1% of younger children and 70.68% of older children identified Scared when it was meant to be the correct response. This contrasts with 27.32% of younger children and 31.78% of older children identifying Scared when it was meant to be the correct response on the measure of situational EID. This suggests that the task of situational EID was considerably more difficult for children than was the task of facial EID, and that children between the ages of three and six may not be

developmentally ready to identify emotions based on situational cues. Future research should test the hypothesis with an older sample or longitudinal design.

**Avoidance of Mad and Scared**

If children are confusing emotions of negative valence, a question remains: why do they default to Sad? If children's response patterns were based in confusion alone, one may think that Sad, Mad, and Scared were equally likely to be chosen as the correct response, yet this was not the case. Of the 174 children included in the analyses, 30 younger children (32.3%) and 30 older children (37.5%) did not ever give the answer Mad while 21 younger children (22.6%) and 13 older children (16.3%) did not ever give the answer Scared. Though Scared was given more frequently than expected by young boys on items where Sad was the "correct" response, it still was given only 32 times (compared to Sad, which was given 137 times). A combination of biological and social factors may help explain this phenomenon. The reviewed literature suggests that among children with and without Autism Spectrum Disorder as well as children with psychopathologies, anger and fear are more difficulty to identify than sadness and happiness (Guyer et al., 2007; Tanaka et al., 2012). These findings are supported by the evolution of EID, in which children's ability to identify happiness and sadness develops before their ability to identify fear and anger. Children in this study may have identified Sad any time a situation had a negative valence because they understand Sad to be the opposite of Happy. However, display rules may also be at play. Display rules, or the types and strength of emotions that can be expressed in different contexts (Brody, 1985), discourage the expression of negative emotions such as anger (Pasalich et al., 2013Shortt

et al., 2015). Children may then learn that negative emotions should be internalized, and therefore that sadness is more socially appropriate than anger.

## Limitations

The present study suffers from a number of limitations, due both to the sample and methodology.

**Limitations of Sample.** First, the sample is from a handful of private schools in an affluent and progressive area of the United States, meaning that children's parents were likely accepting and encouraging of their emotional expression (Raval et al., 2013). As such, results from this study should not be generalized to other subpopulations.

Second, based on the sample size, some of the children in the sample are likely to have psychopathologies which impact their EID. Because presence of psychopathologies was not assessed, it is unknown to what extent this impacted the data.

**Limitations of Age.** The age range of the sample is limited to three to six year olds. As discussed above, this may have limited the number of significant findings because the sample on the whole may have been too young to identify emotions based on situational cues. Furthermore, because few children identified Anger and Fear even on items where those were considered correct responses, it is possible that analyses of the identification of these emotions lacked the power required to detect gender differences. However, the children's under-endorsement of Anger and Fear was unaccounted for by the literature review and suggests that more research on the development of EID in young children, particularly in regards to situational cues, is needed.

Of the studies reviewed, three of the five that found gender differences in emotion competencies used older participants, primarily in their teens (Cunningham et al., 2009;

Denham & Couchoud; Ciarrochi et al., 2008; Reeb-Sutherland, 20015; Sanders et al., 2013). It is possible that the gender differences hypothesized in this study will emerge when the children are older.

**Limitations of Methodology.** First, there may be something about the test environment or measure which elicits sadness rather than anger or fear as the response of choice. For example, the minimized affect with which examiners deliver the vignette may be more in line with sadness than anger or fear. Future research may wish to manipulate the mode of delivery to see if children's patterns of responding change. Second, the assumption of independence was violated in all chi-square analyses. Therefore, the effective sample size may in fact be smaller than the reported sample size due to intra-individual correlations in responses and the observed significant differences may be subject to type I error.

**Limitations in Conclusion.** The presented limitations yield many possible follow-up studies. Future research may compare the ECT to other measures of emotion identification or explore the relationship of children's patterns of responding on EID tasks to the variables known to impact children's emotion competencies, including temperament, psychopathology, and parent socialization.

## Chapter 6: Conclusion

ANCOVA and chi-square analyses found little support for gender differences in EID, either in the traditional method of comparing scores or by comparing children's response patterns. Results surrounding age effects and sample-wide patterns of responding were more notable. These results demonstrate that children's ability to identify conventional emotions based on situational cues lags behind their ability to

identify conventional emotions based on facial cues. Specifically, though the children in this sample distinguished between facial expressions of sadness, anger, and fear, they primarily identified negative-valence situations as sadness-evoking, demonstrating a lack of understanding and/or avoidance of other negative-valence emotions. These findings address gaps in the EID literature by lending insight into how situational EID develops during early childhood and the differences between situational and facial EID. Findings also add evidence to dispute claims that girls are “better” at emotion competencies than boys, or even that girls and boys differ in the way they identify emotions. Further research is needed to assess whether gender differences in emotion competencies develop in later childhood or adolescence, when biological and social influence have strengthened.

**Appendices**

Appendix A

Summary table of studies included in literature review

Emotion Identification

| Study | Age; Number (percent male) | Task Type: Simple EID (Sim), situational EID (Sit), parent-child interaction (PCI), parent report (PR), other (O) | Coding Type: correct or incorrect (1), correct, incorrect, or correct valence incorrect response (2), other (3) | Gender differences examined? | Gender differences found? (X indicates not tested) | Summary of Methods |
|---|---|---|---|---|---|---|
| Reeb-Sutherland, 2015 | M=15.06; 103 (51% m, 41% with inhibition) | Sim | 1 | Y | Y: Sig sex effect on EID in fear-happy and happy-sad continua. Males had a lower threshold than females for identifying happiness when blended with fear or sadness | Participants viewed greyscale images of morphed expressions (angry-fear, angry-sad, fear-happy, happy-sad) in different ambiguities (40/60, 70/30 etc.) and selected what emotion label best described the image. Total of 224 trials. |

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| Guyer et al., 2007 | 7-18; 42 bipolar, 39 mood disregulation, 44 anxiety or MDD, 35 ADHD or CD, 92 controls | Sim | 1 | N | X | Diagnostic analysis of nonverbal accuracy–shown 24 photos of children or adults displaying high- or low-intensity happiness, sadness, anger, or fear. Participants pressed a button for which emotion was depicted in forced choice format. |
| Rieffe & de Rooij, 2012 | M=10.3; 663 (56% m) | O: Child report | 3 | N | X | Children completed Emotion Awareness Questionnaire (EAQ30) 4 times over 2 years. The EAQ30 has 30 items on a 3 point response scale pertain to emotional differentiation, verbal sharing, not hiding, bodily awareness, attending to others, and analysis of emotions. |
| Norvilitis et al., 2000 | M=10.27; 44 w/ ADHD (70% m), 36 control (67% m) | Sim, Sit | 2 (Task 1), 3 (Tasks 2 and 3) | Y | N: Group differences were not due to gender | 1. Children looked at 14 pictures of facial expressions (happy, angry, sad, scared, I or a blend of 2) and Ided the emotion or blend of emotions shown. 2. Children listened to a tape of conversations in which emotions (happy, sad, anxious, or angry) were expressed. Children were asked what emotion was expressed and why. 3. Children watched videotape of a same-gender child demonstrating happy or angry affect and were asked open-ended how they thought the child was feeling, to ID which of 5 faces was |

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| | | | | | | closest to the emotion of the child, and how they felt while watching the tape. |
| Tanaka et al., 2012 | 5-20; Autism: 85 (84% m), control 130 (67% m) | Sim | 1? | N | X | 1. An emotional face and six emotion names were shown. Participants had to select the name that best described the depicted emotion. 2. An emotional face and three probe faces were presented. Participants had to pick the probe face that best matched the emotional face. 3. Participants are shown a consistent (top and bottom halves of face show same expression) or inconsistent face and tested for recognition of a facial feature as presented in isolation or whole face. |
| Martin & Green, 2005 | 3; 50 (50% m) | Sim, Sit, PCI | ?, 3 | Y | N: There were no significant gender differences in EID; however, maternal emotion talk was a stronger predictor of boys' than girls' emotion talk and was a predictor of boys' but not girls' EID. | 1. Name the facial expression shown (happy, sad, anger, fear). Then point to the facial expression showing each emotion. 2. Identify how the puppet would feel in 8 vignettes 3. Identify how the puppet feels (based on body language and verbal comments) in 12 vignettes where the puppet feels differently from the child's emotions in that situation. |

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| Cunningham et al., 2009 | 9-13; 69 (49% m) | PR | 3 | Y | Y: Boys had higher composite internalizing score (indicated greater internalizing behavioral tendencies) | Semi-structured interview in which participants were read 3 scenarios and asked open-ended questions about how they'd feel, what they'd do, why they think the other person is feeling a certain way, etc. Rated on ability to verbalize emotion knowledge, recognition of multiple simultaneous emotions, causes of emotions, strategies for emotion regulation, and perspective taking. The interview was conducted twice, 6 months apart. |
| Mathieson & Banerjee, 2010 | 1-4; 195 (54% m) | Sim | 1 (Task 1), 2 (Tasks 2 and 3) | N | X | 1. Indicate which of two photos shows a particular emotion (happy, angry, or sad). 2. Indicate which of 3 puppet faces shows a particular emotion (happy, angry, or sad). 3. Verbally state what each puppet feels. |
| Laghi et al., 2014 | 6; 251 (44% m) | | 1 | N (not pertaining to EID) | X | 1. TEC (Separate versions for girls and boys), all sections. Scored 1 for correct answer and 0 for incorrect.2. Children named the best friend they had drawn in the picture. A friendship was conted as reciprocal if children selected one another as best friends, unilateral if child selected a classmate as best friend but was not reciprocated, and was not counted if the child identified a non-classmate as a best friend. |

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| Liao, Li, & Su, 2014 | 4-6; 47 (49% m) | Sim | 1 (Tasks 1 & 2), 3 (Task 3) | N (not pertaining to EID) | X | 1. Asked which of 4 pictures had the happy/sad/scared/disgusted face 2. Asked what each of the 4 pictures felt like (same options). 3. Shown conflict scenarios (of physical, verbal, and relational aggression) using cartoons of human (same gender) and animal figures and asked the children to rate the victim's post-conflict emotions from 1=very sad to 7=very happy. Higher score meant less emotional understanding and empathy. Were also asked yes/no qus about the possibility of 87arents87iation. |
| Karstad et al., 2015 | 4-7; 974 (48% m) | Sim | 1 | Y | N: Gender was not significantly correlated with EID when controlling for other factors, including parent mentalization, verbal ability, and social skills | TEC-Norwegian |
| De Stasio et al., 2014 | 3-6; 102 (53% m) | Sim | 1 | N | X | TEC-Italian |
| Martins et al., 2016 | M=4.6; 75 (% m unknown) | Sim | 2 | N | X | Emotion recognition questionnaire: children identify whether a given situation would make a child happy, mad, sad, or scared. |

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| Denham & Couchoud, 1990 | 2-4; 45 (56% m) | Sim, Sit | 1 | Y | Y: Girls better at naming fear | 1. Name 4 facial expressions in drawings (sad, happy, angry, scared) 2. Point to which expression shows the – face. 3. 8 vignettes with puppets. Asked 'how does the puppet feel' and affixed a face with an emotional expression to the puppet. Options include the same 4 emotions with a don't know option |
| Duncombe et al., 2013 | 7-9; 191 (72% m) | Sim, O: generate list of feeling words, explain how you know when you're feeling a given emotion | 1 or 2 (Task 1), 3 (Tasks2 & 3) | Y | N: Gender did not correlate significantly with any variable besides behavior problems | Kusche Affective Interview-Revised. 1. Name the emotion depicted in photo (happy, sad, scared, angry) 2. Generate a list of feeling words 3. How do you know when you and others are feeling (happy, scared, sad, angry, jealous)? |
| Roswell | M=13.41 at t1. 796 (51% m) | O: Child report | 3 | Y | Y: For females, emotion awareness in 8th, 9th, 10th, 11th, and 12th grade was significantly correlated with friendship nominations by both males and females. However, correlations for male friendships | Toronto Alexithymia Scale, a self-report measure of emotion understanding using a 5-point Likert scale. Assesses ability to identify, describe, and think about/explain emotions. |

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| | | | | | were negative; the largest positive correlation was .23 for EIS at grade 10 and grad 12. For males no significant correlations were found. | |
| Ciarrochi et al., 2008 | M@T1=13; M@T2=14; 779 (51% m) | O: child report | 3 | Y | Y: Girls reported more sadness and fear, more positive affect, and higher social support quality and quantity than boys overall. Gender differences were held across time. There was no gender difference in EID skill. | Emotion identification skills (EIS), a subtest of the TAS-12 that assesses difficulty identifying and describing motions. Self-report. Examples: I am often confused about what emotion I am feeling; it is difficult for me to find the right words for my feelings. Correlations, repeated measures ANOVAs, and structural equation model analyses were conducted to examine the relationship between measure outcomes. |
| Emotion Socialization | | | | | | |
| Van der Pol et al., | 2-5; 317 families | PCI | 3 | Y | Y: There were not significant effects | The Emotion Picture Book shows gender-neutral children expressing |

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| 2015 | (26% girl-boy, 27% boy-boy; 24% boy-girl) | | | | between parent or child gender and emotion talk. For first born children, parents used the label girl more often with daughters but not sons when discussing happiness. Fathers used the label boy more than the label girl when talking about anger. For both the first and second born children, 90 parents used the label boy more often than the label girl when discussing anger and the label girl more often than the label boy when talking about sadness. For the second child, parents also used the label girl more often than boy when talking about happiness. | anger, fear, sadness, and happiness both in and out of context. Moms and dads were asked to discuss the book with their children and were coded for talking about emotion, talking about emotion behavior, and talking about the cause of the emotion all via asking, labeling, involving the child, and involving another (emotion talk). It was also coded how parents labeled the genders of children pictured. |
| Sanders et al., 2013 | 8-11; 84 (57% m) | PR | 3 | Y | Y: Parental reports of child anger coping were higher for girls than boys. | Emotions as a child scale (EAC) for parental emotion socialization (Magai, 1996), parent report of children's anger management scale (P-CAMS) and children's sadness |

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| | | | | | | management scale (P-CSMS), children's depression inventory self-report. |
| Shortt et al., 2015 | 14-18; 107 (39% m) | PCI, PR, O: child structured interview | 3 | Y | Y: Mothers and fathers of boys with depressive disorder were more punitive in reaction to anger than parents of non-depressed boys. Fathers but not mothers of girls with depression were more punitive in reaction to anger than fathers of non-depressed girls. Fathers but not mothers of adolescents with depressive disorder were more punitive in response to sadness than fathers of non-depressed adolescents. | Parent meta-emotion interview is coded for awareness, coaching, and acceptance of anger and sadness on 5-pt likert scales. Child and adolescent meta-emotion interview asks about emotions and how mothers and fathers help with emotions. Coded on 5-pt Likert – type scale. |
| Pasalich et al., 2013 | 7-12; 111 (76% m) | PCI, PR | 3 | Y | Study 2: For boys, callous-unemotional traits were positively correlated with mothers' emotion dismissing. | 3 family interaction tasks, 18 minutess each, coded with Living in Family Environments Coding System. 1. Plan a vacation and reminisce about a fun family experience 2. Discuss and resolve two areas of conflict 3. Talk about the most difficult years of the adolescent's life and most challenging and rewarding aspects of parenting.<br><br>Study 1: Emotion-related parenting styles self-test assesses parents' emotion socialization of anger and sadness. Yields scores in dismissive, disapproving, laizzes-faire, and emotion coaching. Study 2: Parents and children talked about a time they had shared together (happy or sad) for 10 minutes. |

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| | | | | | | Conversations were coded for parents' emotion socialization in language and behavior. |
| Brown et al., 2015 | 4-10; 495 (53% m) | PR | 3 | Y | Y: For girls, black and Lumbee mothers were more supportive than fathers. The same pattern approached significance among white parents. For boys, black mothers were less supportive than fathers, Lumbee mothers and fathers were equally supportive, and white mothers were more supportive. | Self-Expressiveness in the Family Questionnaire, Coping with Children's Negative Emotions Scale |
| Raval et al., 2013 | 1st and 4th grade; 180 (50% m) | PR, O: child report | 3 | N | X | Parent Response to Children's Emotions Questionnaire, Coping with Children's Negative Emotions Questionnaire; Children's reported likelihood of expressing felt emotion: a structured interview adapted from Zeman and Garber, 1996. Children responded on a 1-4 scale |

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|---|---|---|---|---|---|---|
| Dodd et al., 2012 | 3-4; 65 inhibited (46% m), 66 uninhibited (50% m) | O: Children ended ambiguous stories | 3 | N | X | Children were shown dolls and told three ambiguous story stems. They were instructed to ‘show me what happens now’ using the dolls. Stories were coded according to whether threat was interpreted (for a total threat interpretation score of 0-3). If it is unclear whether threat was interpreted, the story was counted as missing data. |

Appendix B

Example vignettes included in the Emotion Comprehension Test Situations Subtest

Item 2: Green just finished coloring a picture. (Narrator demonstrates with Red puppet): "It looks really nice." How do you think Green feels: happy, sad, mad, scared, or no feeling?

Correct response: Happy

Item 5: Green built a big tower of blocks. Red came over and knocked them down and then laughed. How do you think Green feels: happy, sad, mad, scared, or no feeling?

Correct response: Mad

Item 8: Green was riding a tricycle down a big hill and it started going faster than Green wanted. How do you think Green feels: happy, sad, mad, scared, or no feeling?

Correct response: Scared

Item 10: Green's grandfather died. How do you think Green feels: happy, sad, mad, scared, or no feeling?

Correct response: Sad

Item 11: Green's parents are yelling at each other in the other room. Green can hear them and thinks they are fighting. How do you think Green feels: happy, sad, mad, scared, or no feeling?

Correct response: Sad or Scared

Follow-up: (Re-read the prompt). You said that Green felt ___. Tell me more about Green feeling ___.

Appendix C

Sample-wide patterns of responding

| Emotion | Frequency with which emotion is a "correct" response | Modal frequency | Interquartile Range | Number of children responding unusually infrequently (25th percentile-1.5*IQR) | Children responding unusually frequently (75th percentile+1.5*IQR) |
|---|---|---|---|---|---|
| Happy | 3 | 3 | 3 to 4 | 16. 7 said Happy 0 times, 9 said Happy 1 time. | 6. 2 said Happy 6 times, 1 said Happy each 7, 8, 9, and 15 times. |
| Sad | 6 | 8 | 6 to 9 | 7. 5 said Sad 0 times, 2 said Sad 1 time. | 1. 1 said Sad 15 times. |
| Mad | 6 | 0 | 0 to 3 | n/a. However, 60 children said Mad 0 times | 3. 1 child said Mad each 8, 9, and 11 times. |
| Scared | 5 | 1 | 1 to 3 | n/a. However, 34 children said Scared 0 times. | 1. 1 child said Scared 10 times. |
| No Feeling | 0 | 0 | 0 to 1.5 | n/a. However, 92 children said No Feeling 0 times. | 18. 3 children said No Feeling 4 times, 2 said it 5 times, 6 said it 6 times, 2 said it 7 times, 2 said it 8 times, 1 said it 9 times, and 1 said it 15 times. |

Appendix D

Items with significant differences in response patterns due to age

| Item | "Correct" emotion | Chi-square | Df | Sig. |
|---|---|---|---|---|
| 1 | Sad or Mad | 19.54 | 4 | .001 |
| 2 | Happy | 18.11 | 4 | .001 |
| 10 | Sad | 15.67 | 4 | .004 |
| 12 | Sad or Scared | 9.42 | 3 | .02 |
| 15 | Happy | 18.35 | 4 | .001 |

Appendix E

Item 11 patterns of responding by gender

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | Count | Expected Count | % within Gender | Count | Expected Count | % within Gender |
| Happy | 5 | 3.8 | 6.10% | 3 | 4.2 | 3.30% |
| **Sad** | 22 | 20.9 | 26.80% | 22 | 23.1 | 24.20% |
| Mad | 11 | 17.5 | 13.40% | 26 | 19.5 | 28.60% |
| **Scared** | 28 | 22.3 | 34.10% | 19 | 24.7 | 20.90% |
| No-Feeling | 16 | 17.5 | 19.50% | 21 | 19.5 | 23.10% |
| Total | 82 | 82 | 100.00% | 91 | 91 | 100.00% |

Note: Correct answers are in bol

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