

Parenting, Executive Function, and Children's Emerging Emotional Intelligence

by

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## ABSTRACT

The construct of adult emotional intelligence has gained increasing attention over the last 15 years. There is a gap, however, in understanding how emotional intelligence develops in children. Parenting is one of the most salient predictors of children's behavior and the current study investigated the distinct contributions of maternal sensitivity and emotion socialization to children's emotional intelligence. In addition, executive function, considered a "conductor" of higher-order skills and a neurocognitive correlate of emotional intelligence, was examined as a possible mechanism by which parenting influences emotional intelligence. Data were collected from 269 Mexican-American mother-child dyads during 2-year (parenting), 4.5-year (executive function), and 6-year (emotional intelligence) laboratory visits. Both parenting variables were assessed by objective observer ratings. Executive function and emotional intelligence were examined as latent constructs comprised of relevant parent-reported and objective measures. Due to a lack of adequate fit, the emotional intelligence variable was separated into two distinct latent constructs, emotion knowledge/understanding and emotion dysregulation. Results indicated that neither dimension of parenting was predictive of dimensions of emotional intelligence. On the other hand, children's executive function was positively related to emotion knowledge. Finally, executive function did not emerge as a mediator of the relation between parenting and dimensions of emotional intelligence. Taken together, these findings highlight the need for advanced developmental and bioecological framework in the study of children's executive function and emotional intelligence.

To my friends and family,  
who have provided unwavering support while  
I follow my dream of becoming a neuropsychologist.

And to my fellow students who have dealt with null results,  
let us remember the importance of the dissertation as an exercise  
in scholarly research and continue to pursue ambitious ideas.

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The last fifteen years have seen a growth in interest and understanding of the construct of Emotional Intelligence (EI). The most widely used conceptualization of EI suggests that competencies for regulating, understanding, and labeling emotions are critical for adaptive development (Mayer & Salovey, 1997) and numerous school- and community-based programs have been designed and implemented to target emotion-specific domains (e.g., RULER; Brackett, Rivers, Reyes, & Salovey, 2010). Although EI, as a unified construct, is understudied in children, its underlying components are not (i.e., emotion knowledge, emotion understanding, self-regulation). These three factors have uniquely and cumulatively been linked to later academic, social, and emotional competencies. Due to their established importance, understanding the process by which they develop is of interest. Early experiences broadly, and parenting more specifically, have an established impact on children's later emotional development. Although parenting is multi-dimensional, few studies have compared the strength in contribution of specific parenting behaviors on children's competencies. In addition, the pathways by which parenting affects emotional competencies are complex, and not fully understood. Children's executive function, or the higher order skills needed to engage in goal directed behavior, might be a neurocognitive pathway by which parenting effects emotional intelligence. Understanding parenting contributions to children's EI and the pathways by which this occurs may inform intervention and prevention services by articulating specific targets for intervention. See Figure 1 for a conceptual model of this process.

### **Defining Emotional Intelligence**

EI is a multifaceted construct that has been studied from multiple perspectives. Three main theories of EI dominate the literature: trait, mixed, and ability. Supporters of

the trait model contend that EI can be considered part of an individual's personality (Perez, Petrides, & Furnham, 2005). In contrast to other models, trait theorists believe that aspects of EI are more similar to personality traits and should therefore not be considered competencies or abilities (Petrides, 2010). This is supported by the notion that the same genes that are implicated in the development of the Big Five personality traits are also implicated in individual differences in the development of trait EI (Vernon, Villani, Schermer, & Petrides, 2008). Trait EI has been positively correlated with measures of well-being (Petrides, Pita, & Kokkinaki, 2007) and academic success (Jaeger, 2003; Perera & DiGiacomo, 2015), and negatively correlated with psychopathy (Malterer, Glass, & Newman, 2008). In one study, Petrides and colleagues (2004) found that high trait EI was associated with better academic performance for those children with low IQ, suggesting that trait EI may buffer the effects of low verbal and non-verbal intelligence on academic performance. Because trait EI tends to positively correlate with other personality factors, there are questions about whether it represents a distinguishable construct from other personality facets.

The mixed model of EI is conceptualized as subjective emotion-related personality factors in addition to learned emotional competencies (Bar-On, 1997; Goleman, 1998). These include self-awareness, self-regulation, motivation, empathy, and social skills. Bar-On (2005) also includes factors such as assertiveness, independence, and optimism, among others. Critiques of this model suggest that it encompasses a conglomeration of existing constructs, rather than describes a distinct construct of intelligence. In fact, Bar-On (2005) defines EI as the “cross section of emotional and social competencies that determine how well we understand and express ourselves, relate

with others, and cope with daily demands and pressures.” This conceptualization of EI seems to broaden the construct beyond one that is independently measurable.

A third theory of EI guides the proposed research and views emotions and cognition as interacting with each other on an ability level. Whereas trait and mixed EI tend to correlate better with personality measures, the ability model correlates with cognitive IQ (Mayer, Salovey, Caruso, & Sitarenios, 2003). This four-branched model, as defined by Mayer and Salovey (1997), includes abilities to (1) accurately perceive emotions, (2) access and generate emotions so as to assist thought, (3) understand emotions and emotional knowledge, and (4) reflectively regulate emotions so as to promote emotional and intellectual growth. There are arguments, however, for a three-factor model that excludes the ability of emotions to assist thinking (branch two). Indeed, this branch has not fit in a number of confirmatory factor models (Joseph & Newman, 2010; Legree, Pstoka, Roberts, Robbins, Putka, & Mullins., 2014; MacCann, Joseph, Newman, & Roberts, 2014). As such, the proposed study will concentrate on children’s ability to accurately perceive (label), understand, and regulate emotions.

Perceiving and understanding emotions in one’s self and others are two critical competencies (Mayer & Salovey, 1997). The more accurately a child can label an emotion, the more likely he/she is to respond appropriately. However, if children misidentify an emotion, or can not read the emotional cues of others, they are likely to encounter interpersonal difficulties (Laghi, Baiocco, Di Norcia, Cannoni, Baumgartner, & Bombi, 2014). The ability to identify and understand emotions in context is also central to successful transition to school due to its relation to children’s prosocial abilities and peer status (Denham, 1998; Gross, Drummond, Satlof-Bedrick, Waugh, Svetlova, &

Brownell, 2015). Emotion knowledge has been specifically linked to the development of empathy, which is conceptualized as the ability to develop concern for another person based on an understanding of how they feel (Eisenberg & Fabes, 1990).

Emotion regulation is a third critical component of the EI ability model. Although it is often difficult to differentiate between emotion regulation and emotion itself (Cole, Martin, & Dennis, 2004), regulation involves behaviors that result in changes in an emotion expression and experience. Although emotion regulation encompasses a broad set of attributes, the EI ability model tends to consider regulation in terms of emotional “self”-regulation. Central to self-regulation is an individual’s ability to modulate negative/positive emotion (Kopp, 1989). This ability is measurable by observing individual’s deployment of regulatory strategies or obtaining parent-report of children’s regulatory strategies. In children, studies of parent-child separation have identified various regulatory strategies that young children deploy when distressed including self-distraction, self-soothing, and bids for parental attention (Grolnick, Bridges, & Connell, 1996). In school-aged children, self-regulatory abilities relate to more focused attention, an increased ability to follow directions, and improved peer-to-peer interaction (Blair & Diamond, 2008). Dysfunctional operation of the emotion regulation process is referred to as “dysregulation” (Cole, Martin, & Dennis, 2004), which is represented by inappropriate emotional reactions, poor control over emotions, and failure to adequately express emotions.

EI as a construct has primarily been measured through objective, performance-based scales in adult populations only (Zeidner, Matthews, Roberts, & MacCann, 2003). Measurement in toddlers and young children is somewhat more complicated, with little to

no research delineating ways to measure the construct during these developmental periods. Although the empirical structure of EI in children is largely unknown, research to date has separately examined individual branches of EI (e.g., Denham, Bassett, Way, Mincis, Zinsser, & Graling, 2012; Eisenberg, Fabes, Murphy, Maszk, Smith, & Karbon, 1995). Emotion knowledge, understanding, and regulation are often studied under the umbrella term of emotional competence, rather than EI. Competencies include, but are not limited to, self-awareness, empathy, conflict management, trustworthiness, and social skills. Indeed, there may be a definitional problem due to the complex overlap in emotional competence and EI. Saarni (2007) suggests that emotional competence is the developmental equivalent to the adult conceptualization of EI. In this sense, the frameworks have been conceptualized as equivalent; however, there is also support for a symbiotic relationship. One integrative model purports that EI, as an ability framework, may moderate the relation between trait EI and emotional competencies (Seal & Andrews-Brown, 2010). In other words, ability EI is necessary, but not sufficient in predicting behavior. Another model suggests that ability EI predicts to behavior through its effect on emotional competencies (Abraham, 2004). Goleman (1998) suggested that people have EI (ability) potential, but also have to develop aspects of emotional competence. As an example, an individual who can label and understand emotions has the potential to develop empathy (Vaida & Opre, 2014). Taken together, evidence suggests that EI has distinct as well as overlapping elements with emotional competence, and constructs underlying EI may have a unique developmental course.

### **Development of Emotional Intelligence**

EI can be viewed as a specific emotion-related ability that may be partly

biologically based but is also a product of one's environment. EI is considered distinct from cognitive intelligence in that EI is often conceptualized as a learnable form of intelligence (Mayer, Salovey, & Caruso, 2000), although the manner with which it is taught is unclear. Temperamentally based differences may provide a biological foundation to understand emotional intelligence but parenting and other contextual factors provide necessary rule-based skills.

The capacity to express emotion-related language begins around two years of age (Denham, 1998), although there is considerable variability in this skill. Oftentimes, this is dependent on the amount of exposure to emotion-related language the child experiences. During parent-child interaction, children continue to look to their caregivers to better understand their experiences of emotion. As such, this is a time when emotion socialization practices may serve an especially important role. Across the toddlerhood years, children begin to understand the complexity of emotions (Scharfe, 2000). Children are not only expressing a range of emotions during this time, but they are learning the differences between emotions at the same time. Typically, these skills are learned via observation of others, as well as through the support of caregivers. Between the ages of three and five, the ability to verbally label basic emotions develops (Stifter & Fox, 1987). Somewhat hierarchically, the ability to understand emotions in context is a more mature skill than basic labeling of emotions and, with age, this ability becomes more salient. Preschool children are able to understand that simultaneous emotions are possible (Denham, 1998). For example, a preschooler or kindergartener may be able to detect fear in someone when he is also crying through context-specific clues.

Emotion regulation, although unsophisticated at first, is evident in the first weeks

of life when preverbal infants employ strategies such as thumb sucking and gaze aversion (Kopp, 1989). During infancy, caregivers are thought to be responsible for helping their infants manage varying levels of distress (Campos, Campos, & Barrett, 1989) and there is a dependence on caregivers for regulatory support. With age, children become more purposeful in their strategy use and rely less and less on their caregivers. In pre-school, self-distraction and rule-based strategies are deployed to regulate feelings and emotional displays (Denham, 1998). In later years, children use more insightful self-regulatory behaviors and they may even be sensitive to the social and cultural environment (Saarni, 2007).

### **Importance of Emotional Intelligence**

Labeling, understanding, and regulating emotion during early childhood has remarkable implications for later adaptive functioning. Specifically in children, there is considerable evidence that early emotion knowledge relates to later socioemotional functioning, and a lack thereof is predictive of a compromised social and behavioral system (Trentacosta & Fine, 2010). EI is also related to affective disorders (i.e., anxiety and depression) and other psychopathology, such as alexithymia (Parker, 2005; Taylor & Bagby, 2004). Alexithymia, although vastly understudied, refers to a limited ability to recognize and verbalize one's own emotions and/or the emotions of others (Sifneos, 1996). Subclinical or clinical levels of alexithymia are a risk factor for a wide range of health related problems (Bagby, Parker, & Taylor, 1994; Brewer, Cook, Cardi, Treasure, & Bird, 2015). Impaired EI may predict to, or relate to, alexithymia in the same way that impaired positive affect relates to anhedonia. In addition, Suveg and Zeman (2004) found that children who met diagnostic criteria for an anxiety disorder exhibited difficulty

managing their emotions, had little confidence in their ability to manage their emotions, and experienced emotions with greater intensity than normal. Although not a direct measurement of EI, this study identified deficits in two branches of EI, mainly self-regulation and effective use of emotions to guide decisions. EI likely indirectly relates to psychopathology through various mediators, including increased aggression, diminished capacity for empathy, and interpersonal and intrapersonal deficits.

EI has also been tied to problem behaviors and academic incompetency. Specifically, emotion knowledge was concurrently related to teacher-reported social behavior problems, after controlling for verbal ability (Schultz, Izard, Ackerman, & Youngstrom, 2001) and it has been found to mediate the relation between verbal ability and academic competence (Izard, Fine, Schultz, Mostow, Ackerman, & Youngstrom, 2001). Although limited research exists in this area, children's social competencies (i.e., peer relations, aggression, empathy) may mediate the association between EI and academic competencies, such that the development of these social competencies depends on high levels of EI. Indeed, research supports an ongoing link between children's social effectiveness and their emotion understanding, emotion perception, and intensity of emotion expression (Buckley & Saarni, 2006). The ability to successfully navigate the social world of primary school serves to influence both children's motivation to learn and their relationships with their teachers and peers, which likely play a role in their academic successes. Academically, studies often focus on school readiness, which can be defined as the mastery of certain basic abilities that permit a child to have success in a school setting, both academically and socially (Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006). It is typically conceptualized across cognitive, physical, and social-emotional



domains and disparities in these areas are likely a result of additive factors including low socioeconomic status, diminished access to resources, low parental education, and parental mental health concerns, among others (Zill & West, 2001). Children from low-income families experience stress that is hypothesized to have a negative impact on parents' emotional repertoire. Although many researchers examine the reading and math disparities that exist between "advantaged" and "disadvantaged" children, they often ignore social-emotional discrepancies, which may have a mediating effect on academic skill.

Furthermore, research has acknowledged the specific importance of EI factors on social-emotional competencies at the transition to formal school time period. Izard and colleagues (2001), in their longitudinal study of Head Start families, found that emotion recognition and emotion labeling at age five predicted later social and academic competence. In addition, economic and neighborhood stress put low-income children at risk for inadequate emotion regulation (Garcia Coll et al., 1996). Children who are more knowledgeable about emotions tend to be well prepared for the social and emotional demands of schools (Denham, McKinley, Couchoud, & Holt, 1990). In later years of schooling, EI may shield students from obstacles to learning such as distress, school dropout, aggression/violence, and substance abuse (Hawkins, Smith, & Catalano, 2004).

### **Maternal Sensitivity and Emotional Intelligence**

Simons and colleagues (2005) suggest that parenting quality explains more variance in child/adolescent behavior than any other contributing factor. Importantly, the first two to three years of life has been identified as a sensitive period for neurological development of emotion competence (Pratt, Goldstein, Levy, & Feldman, 2017; Schore,

2001). Indeed, a child's ability to use and understand emotions functionally and effectively begins in the context of the caregiver-child relationship with children often looking to their mothers for affective information (Boccia & Campos, 1989). More generally, children's first five years of life are critical for the foundation of early social-emotional, cognitive, and regulatory skills that then serve as precursors for later functioning (Shonkoff & Phillips, 2000).

Maternal sensitivity has been defined as a caregiver's ability to accurately perceive, interpret, and respond to the child's behavioral signals promptly and adequately (Ainsworth, Blehar, Waters, & Wall, 1978). Various factors have been implicated in sensitive parenting, including parental warmth, responsiveness, non-intrusiveness, and synchrony. Considerable evidence suggests that infants develop healthy relationships and social-emotional skills because of early sensitive interactions with their mothers (Ainsworth, Blehar, Waters, & Wall, 1978). From an evolutionary perspective, caregivers' immediate responses to their infants served to keep the pair safe from predators and the more intense the distress, the more quickly the caregiver needed to respond in order to protect herself and her child. In this sense, an immediately sensitive response to distress kept the pair alive (Schon & Silven, 2007). This behavior continues today such that, in sensitive caregivers, there is an instinctual drive to respond to a child's cues, although sensitivity has evolved to include both distress and non-distress signals.

Parental responsiveness or warmth is associated with improved psychological adjustment (Eiden, Edwards, & Leonard, 2007), adaptive biobehavioral regulation and cortisol levels (Spangler, Schieche, Ilg, Maier, & Ackermann, 1994), better coping skills (Watson et al., 2014), more secure attachment (Ainsworth, Blehar, Waters, & Wall,

1978), and fewer behavioral problems (Shaw, Keenan, & Vondra, 1994). More specifically related to EI, research has connected parental warmth to children's emotion knowledge and emotion understanding (Alegre & Benson, 2007), and children's emotion regulation (Morris, Criss, Silk, & Houlberg, 2017). Work with maltreated infants further purports that infants who do not receive adequate assistance from their parents are less able to effectively express their emotions and constructively cope with emotional arousal (Shipman & Zeman, 2001).

During toddlerhood, mothers have to shift their parenting to reflect developmental changes in their children including increased locomotion, autonomy-seeking behaviors, and language. The critical transition to self-regulation also develops exponentially during the toddlerhood years (Calkins, Smith, Gill, & Johnson, 1998). The second year of life, specifically, is notable for toddlers' newfound active defiance in the form of autonomy-seeking behaviors coupled with an increased capacity to say "no." At the same time, there tends to be more purposeful anger when children's ability to independently explore the environment is interrupted or restricted (Lieberman, 1996). Indeed, evidence suggests that parent-child coercive behaviors typically emerge in toddlerhood (Chang & Shaw, 2016), likely due to more willful defiance and increased parental discipline. These developmental changes and new challenging child behaviors require sensitive behaviors that are not only distinct from infancy, but also may uniquely contribute to children's future functioning.

### **Emotion-Driven Parenting**

Whereas maternal sensitivity may represent a broad construct of "responsive parenting", emotion socialization involves a specific group of parenting behaviors that

more directly target emotional processes. Importantly, few studies have explicitly compared the strength of various parenting strategies on children's competencies with one notable exception. Davidov and Grusec (2006) demonstrated distinctions between responsiveness to distress and general warmth in a study of 6-8 year olds. They found that parental responsiveness to distress better predicted children's negative emotion regulation, empathy, and prosocial behavior than did parental warmth. Warmth, however, was more strongly linked to positive emotion regulation than response to distress. They concluded that differentiating parenting behaviors helps to clarify the underlying processes of child development. In another study of 119 toddlers and their mothers, maternal responsiveness was identified as a pathway by which emotion socialization affects children's socio-emotional competence (Brophy-Herb et al., 2011). Results of this study supported a stronger direct effect between emotion socialization and socio-emotional outcomes as compared to the mediated indirect effect.

Emotion socialization can be defined as the way caregivers model emotional expression, how they react to their child's emotions, and how they directly assist (or not) their child to learn about emotional responses (Eisenberg, Cumberland, & Spinrad, 1998). As its name implies, emotion socialization is emotion-driven, whereas sensitivity is more specific to warmth and responsivity. Emotion socialization involves sensitive parenting but is more narrowly focused on emotion-related parenting processes. Emotion socialization occurs through both direct and indirect mechanisms. More directly, parents can "coach" their child through an emotional experience and can engage in discussion about emotions with their children (Gottman, 2001). Parents skilled at effective emotion coaching tend to not only validate their children's emotions, but also help them through

intense and/or difficult emotions (Lunkenheimer, Shields, & Cortina, 2007). Emotion coaches can label, and help children label, their emotional experiences, also a form of “emotion coaching”. Emotions are socialized more indirectly through parental modeling of emotion expression (Saarni, 2007), parental reactions to distress, and parental encouragement or discouragement of a wide range of emotions (Eisenberg, Fabes, Shepard, Guthrie, Murphy, & Reiser, 1999). There is considerable variability in the way parents respond to their children’s negative emotion, and this has become a central mechanism of the socialization process. Much socialization research separates responses to distress into unsupportive and supportive behaviors. Unsupportive reactions include distress (e.g., gasp), minimizing (e.g., “stop crying; don’t be a baby”), ignoring, and punitive (e.g., “if you don’t stop crying, I’ll call daddy”) reactions. Supportive reactions include encouragement (e.g., “it’s ok to cry”), comforting (e.g., offering a hug), and problem solving (e.g., helping a child when he/she demonstrates frustration) reactions (Eisenberg, Cumberland, & Spinrad, 1998).

Emotion socialization has garnered more attention over the last two decades and its relation to developmental competences is now relatively well established. For instance, maternal emotion coaching has been found to partially mediate the relation between family risk and preschooler’s emotional lability (Ellis, Alisic, Reiss, Dischion, & Fisher, 2013). Emotion socialization has also previously been linked to emotion understanding (Denham, Zoller, Couchoud, 1994) and emotion knowledge (Arsenio, 2003). Importantly, however, results have proven inconclusive with regards to differentiating between non-supportive emotion socialization behaviors and supportive emotion socialization behaviors on children’s emotional outcomes. In one case, the

absence of non-supportive behaviors was more important than the presence of supportive socialization behaviors (Lunkenheimer, Shields, & Cortina, 2007). In another, the opposite occurred such that the presence of socialization behaviors mediated the relation between family risk and children's emotion regulation behaviors (Ellis, Alisic, Reiss, Dishion, & Fisher, 2013). Given such contradictions, the current study will separately analyze the effects of supportive versus non-supportive behaviors on the outcomes of interest.

### **Preschool Executive Function & Emotional Intelligence**

Research in developmental psychology is often concerned with identifying mechanisms by which one competency affects another. Although few studies have examined the direct links between parenting and EI, even fewer have investigated the pathways by which parenting effects EI. One possibility is that sensitive parenting and responses to distress indirectly influence EI by way of children's executive function. Indeed, executive function has received much attention due to its hypothesized role as "conductor" of other skills. Moffitt and colleagues (2011) went as far as to say that dysregulation broadly, and executive control more specifically, may be the most salient factor involved in the development of problem behavior and health problems throughout adolescence and adulthood. One of the hallmarks of the early childhood period is the significant growth of purposeful self-regulation (Flavell, 1977) making it an appropriate time to assess executive function. The executive functions can be thought of as higher order abilities that help individuals manage goal-directed behaviors (Gioia, Isquith, Guy, & Kenworthy, 2000). From a cognitive psychology perspective, goal-directed behaviors are considered distinct from innate reflexes and habits in that they tend to require more

conscious awareness and control. Executive function can be broken down into a number of distinct, yet related abilities. Although there's no clear consensus on what constitutes an executive function, there is some agreement that the foundational components are *inhibitory control* (sometimes referred to as effortful control; ability to suppress dominant response in favor of a non-dominant one), *working memory* (ability to hold information in mind), and *cognitive flexibility* (ability to shift from one problem solving strategy to another) (Best & Miller, 2010). These factors have most often been correlated with school readiness and academic functioning (e.g., McClelland et al., 2007) but it is plausible that the executive functions are employed for socio-emotional reasons, as well. Indeed, executive function has been linked to emotion knowledge in a number of studies, even after partialling out verbal ability, age, and risk status (Denham, Bassett, Way, Mincic, Zinsser, & Graling, 2012; Schultz, Izard, Ackerman, & Youngstrom, 2001).

Executive Function, as it is conceptualized here, may reflect a neurocognitive requisite for emotional intelligence. Supportive evidence includes the suggestion that EI relates broadly to a regulatory system located in the frontal lobes, the same anatomical location of the executive functions (Rolls, 2004). Some have argued that there may even be a dichotomized relation between emotion and cognitive-related processes. This dichotomy includes “cool” processes that are reflective of cognitive function (e.g., inhibitory control) and “hot” processes that are reflective of emotional function (e.g., emotion regulation) (Zelazo, Qu, Muller, & Schneider, 2005). There is little doubt that cognitive and emotional functions are interrelated and Bell and Wolf (2004) contend that it is critical to examine cognitive and emotional processes together in order to have the most dynamic perspective of child development. Executive function, specifically, likely

relates to EI in a number of ways. For example, inhibitory control may help children access information to accurately label an emotion while ignoring unrelated information (von Salisch, Haenel, & Denham, 2015b). As previously stated, inhibitory control also likely plays a role in children's ability regulate their emotions and control their impulses (Carlson & Wang, 2007; Hudson & Jocques, 2014). Working memory, on the other hand, may help children to hold relevant, salient information in mind in order to understand emotion-laden situations. Cognitive flexibility may be recruited when children need to use critical thinking skills to better understand emotions in context.

Executive function has only minimally been explored as a process variable within the parent-child relationship literature, despite its hypothesized significance on developmental and emotional competencies. It has been studied more extensively with regards to academic self-efficacy and achievement (e.g., Liew, McTigue, Barrois, & Hughes, 2008). As an exception, Mintz & Colleagues (2011), in their study of 1,364 preschool-aged children, found that inhibitory control partially mediated the relation between maternal sensitivity and children's socio-relational competence. Children who received responsive maternal caregiving engaged in higher levels of inhibitory control than children who received unresponsive caregiving, which was associated with better student-teacher and student-peer relationships. Although there is some evidence of a link between executive function and emotional competencies, as well as marginal support of parenting effects on executive function, no study to date has combined all three factors into one model.



## **Parenting and Executive Function**

As is true for most competencies, there is likely both a biological and environmental contribution to the development of executive function. Newer research has consistently shown that the environment can actually alter the development of higher order skills, especially in young children (Blair, Raver, & Berry, 2014; Rushton & Juola-Rushton, 2011). Dishion (2016) identified a reciprocal link between environmental experiences and the development of executive functions over time, and disruptions in the development of the prefrontal cortex can be considered a pathway by which environmental stress affects executive functions (Fishbein, Hyde, Coe, & Paschall, 2004). Indeed, the prefrontal cortex matures relatively slowly, providing substantial opportunity for the impact of environmental factors. Given the plasticity of the developing brain, understanding how parenting factors impact executive function is essential. Emerging research suggests that a supportive caregiving environment likely provides an important context for the development of these higher order skills (Bernier, Carlson, Deschenes, & Matte-Gagne, 2012). Despite its identified importance, the development of central executive skills as a function of early parenting is vastly understudied.

Although limited, connections have been identified between parenting practices and executive function. Bernier and colleagues (2010) linked maternal sensitivity at 12-15 months to performance on executive function tasks 12-15 months later. Similarly, Eisenberg and colleagues (2005) found a mediational role of effortful control in the relation between positive parenting and externalizing problems. Supportive parenting likely provides a context for children to learn effective and constructive ways to process experiences, both cognitively and behaviorally. Given that toddlerhood represents a

period of substantial growth in cognitive and regulatory skills (Garon, Bryson, & Smith, 2008), it is an important developmental period in which to examine parenting. Indeed, findings support a unique contribution of toddlerhood parenting on children's emerging executive functions (Towe-Goodman et al., 2014). Of importance, no study to date has considered the differential role of distinct parenting processes on children's executive functions.

### **Parenting in Context**

Supportive parenting is universally accepted as promotive of child's competence; however, there are undoubtedly unique aspects of parenting within varying socioeconomic brackets and ethnic populations. In general, low economic family status represents one of the many factors that place children at risk for maladaptive development, although the link is likely indirect. One way that socioeconomic status can impact child development is through unsupportive parenting and socialization practices (Cummings & Davies, 1996). Parents under financial burden tend to have a lower access to resources than their wealthier counterparts, which may preclude an accurate understanding or ability to provide what is generally considered "positive parenting." Despite these ideas, other research suggests a need to address the distinct protective strategies that families under socioeconomic pressure utilize. For instance, within majority populations, socializing children through minimization and suppression of distressing emotions has been considered maladaptive (Eisenberg, Cumberland, & Spinrad, 1998). However, within environments marked by increased threat, it may be adaptive to limit the distress that an individual demonstrates. The effects of socioeconomic status on executive function are less consistent than the effects on

emotional development. Whereas there is a general consensus that supportive parenting effects the development of EF, the chaotic and stressful environment of low-income families may not provide as much opportunity for parents to affect cognitive development (Samuelson, Krueger, & Wilson, 2012). Children within these contexts might need to learn the higher order skills more so on their own to compensate for not having their parents' support. Alternatively, these same children may not be inherently able to develop these higher order skills on their own, thus resulting in diminished executive function abilities.

Beyond socioeconomics, the cultural aspects of parenting are also important to consider, and studies have consistently identified pathways of influence that differ depending on the ethnic group studied. For instance, Holochwost and colleagues (2016) identified distinct mediation models for African-American versus European-American families. Whereas maternal sensitivity during toddlerhood mediated the effect of early risk factors on children's executive function at age 5 in European-American children, negative-intrusiveness was the mediator among African-American families. In another study, similarities and differences were uncovered in the effects of parenting on children's emerging school readiness. Using latent class analyses, Dyer and colleagues (2014) identified similar parenting profiles among African-American and Latin American mothers of children at age 2.5. Importantly, however, these parenting profiles differentially predicted to school readiness. Within African-American families, both "child-oriented" and "directive" mothering was associated with better outcomes than "harsh-intrusive" or "withdrawn" profiles, whereas "child-oriented" mothering emerged as the link to school readiness for Latin-American families. Although the sample for the

present study precludes the ability to compare ethnic groups, the proposed study includes a sample of low-income Mexican-American families, which provides a homogenous cultural context with which to study the effects of parenting on child competencies.

### **Current Study**

This study sought to understand the longitudinal relations between early parenting and dimensions of children's EI. Given that different parenting behaviors may have more or less importance depending on the competency of interest, the current study incorporated a differentiated approach to parenting by examining the predictive strengths of maternal sensitivity and emotion socialization on two developmental competencies in children: executive function and dimensions of emotional intelligence. Further, the mediating role of executive function, as one mechanism by which parenting effects emotional intelligence was explored.

*Aim 1: To Examine relations Between Parenting During Toddlerhood and Emerging EI at Age 6 Years.* Maternal sensitivity and emotion socialization are two factors that are consistently related to later social-emotional competencies, yet are rarely directly compared or included together within the same study. As such, the current study investigated the effects of maternal sensitivity and emotion socialization on aspects of children's emerging EI. It was hypothesized that emotion socialization would more strongly relate to children's EI than maternal sensitivity.

*Aim 2: To Examine the Relation Between Parenting and Preschool Executive Function.* The proposed study examined the direct effects of parenting (maternal sensitivity and emotion socialization) on children's executive function. It was hypothesized that both sensitivity and emotion socialization would be significantly

associated with preschool executive function. However, emotion socialization was predicted to have a stronger effect than maternal sensitivity due to its theoretically significant association with child regulatory processes.

*Aim 3: To Examine the Role of Executive Function as a Mediator in the Relation Between Parenting and Emerging EI.* Parenting's contribution to children's emotional competencies is relatively well established, and the current study sought to uncover one possible mechanism by which this process unfolds. Given executive function's role as "conductor" of higher order skills, it was hypothesized that executive function would fully mediate the relation between sensitivity and dimensions of EI. Due to the narrow focus on emotional processes, EF would only partially mediate the relation between emotion socialization and EI.

## **METHODS**

### **Participants**

Data for the current study was drawn from the Las Madres Nuevas (LMN) project, a prospective longitudinal study spanning from the prenatal period to 6 years after birth. Participants in the larger LMN project included 322 Mexican-American women and their children. Women were recruited for the study if they self-identified as Mexican American, had a self-reported annual income below \$25,000 or were eligible for Medicaid funding, spoke English or Spanish fluently, were older than 18, and were expected to deliver a healthy, singleton baby. Time points for the study included third trimester prenatal assessment (for demographic purposes only), and the child age 2 years, 4.5 years, and 6 years. Of the participating families, four became ineligible during the utilized time points due to various factors (i.e., lost custody, death of participant). As a

result, the sample for this study initially included 318 families. Further cleaning of the data revealed that another 49 families did not participate in any of the relevant data points. As a result, the final sample included 269 families.

## **Procedures**

Mothers were recruited through clinics in the Phoenix metro area during routine prenatal care visits. The initial prenatal interview included obtaining informed consent, contact information, and demographic information. After the initial enrollment interview, home and lab visits for data collection were conducted until the child turned six. The proposed study utilized data from the 2-year, 4.5-year, and 6-year lab visits only. Demographic data was taken from the first postnatal home visit with participating families (children at six weeks of age). Female, bilingual interviewers led each lab visit, which included structured interviews, questionnaire presentations, regulatory tasks, and interaction tasks with mothers and their children. Interaction task data from the 2-year visit was used for this study. Interaction tasks included a free play and subsequent cleanup task, a bubbles task designed to elicit enthusiasm and positive affect from the dyad, and a graduated series of parent-directed teaching tasks. The interaction tasks varied in their level of stimulation for the mother and child and also in the level of frustration that was meant to be elicited from the child and their mother. Executive function assessment was derived from the 4.5-year time point and assessment of emotional intelligence was accomplished from the 6-year time point for this study.

## **Measures**

*Maternal Sensitivity.* At the 2-year time point, mothers and toddlers were observed during a number of interaction tasks as noted above. Undergraduates who were

blind to family characteristics and study goals coded these videotaped behavioral interactions. Maternal sensitivity was assessed via the Coding Interactive Behaviors system (CIB; Feldman, 1998). CIB is a global coding system designed to capture the quality of mother and child behavior and emotions across a number of critical dimensions. The CIB system includes 42 scales/behaviors, each rated from 1 (low) to 5 (high). Maternal sensitivity is represented as a composite of 11 observational codes, which has been used and validated in a number of studies (e.g., Feldman, Eidelman, & Rotenberg, 2004; Kim, Feldman, Mayes, Eicher, Thompson, Leckman, & Swain, 2011). These include: Acknowledging, Imitating, Elaborating, Parent Gaze, Positive Affect, Vocal Appropriateness, Appropriate Range of Affect, Resourcefulness, Praising, Affectionate Touch, and Parent Supportive Presence.

*Emotion Socialization.* Observational tasks at the two-year time point were also coded for maternal emotion socialization behaviors. The coding system was first described by Herbert and colleagues (2013) and is conceptualized as an observational adaptation of the parent-reported Coping with Children's Negative Emotion Scale (Fabes, Poulin, Eisenberg, & Madden-Derdich, 2002). The observational coding system was further simplified for use in this study by removing behavioral codes that were identified in other studies to either inadequately fit with other factors or to occur too infrequently for analyses purposes. As a result, reactions to negative affect included: 1) Distress, 2) Minimizing/Discouraging, 3) Problem-Focused, 4) Emotion-Focused, 5) Non-Responsive/Ignore, 6) Punitive, and 7) Expressive Encouragement. All seven parent-child interaction tasks (described above) were individually coded for global frequency of each emotion socialization behavior (from 0 [never] to 4 [very often]). These behaviors were

summed across tasks and then supportive behaviors were averaged together and non-supportive behaviors were averaged together (maximum possible = 28). Supportive reactions included the following codes: Problem-Focused, Emotion Focused, and Expressive Encouragement. Non-supportive reactions included the following codes: Distress Reactions, Minimizing/Discouraging, Non-Responsive, and Punitive Reactions. These composite variables were analyzed separately within the model.

*Executive Function.* At the 4.5-year time point, two observational tasks and one parent-report questionnaire were used to assess executive function abilities. A latent variable was created using dimensions of these measures.

- 1) *Head Toes Knees Shoulders (HTKS; Ponitz, et al., 2008)*: During the HTKS task, children were first asked to simply follow the examiner (e.g., “touch your head”). Then, they were asked to do the opposite of what they are told (e.g., “when I say touch your head, you touch your toes”). As the task progressed, the complexity of the commands increased (e.g., “when I say touch your knees, you touch your shoulders”). The task has been conceptualized as a measure of inhibitory control, working memory, and cognitive flexibility. It measures inhibitory control because a child has to inhibit the dominant response. It measures working memory because the child has to remember the complex rules of the task. Finally, it measures cognitive flexibility because the child must pay attention to changing rules. A total score was calculated by adding up responses for each of the 30 test items (2 = correct; 1 = self-correct; 0 = incorrect). Of note, very few children scored enough points after the first 10 items to continue on



so, to ensure adequate variability and sufficient data inclusion, only scores from the first 10 items were utilized.

- 2) Computerized Performance task (CPT; Bedwell, Kamath, & Baksh, 2006): The CPT is a 7-minute computer task in which children view a series of pictures on a computer screen and are asked to only press the spacebar when a fish, the target stimuli, appears. The task measures inhibitory control because, during half the task, the children are presented with a large number of target stimuli (press spacebar) and a small number of non-target stimuli (do not press spacebar). Children must inhibit the dominant response, which is to press the spacebar. The task also measures attentional control because, during the second half of the task, the children are presented with a small number of target stimuli and a large number of non-target stimuli. Children must maintain their attention on the computer screen so that they do not miss the few occurrences of the target stimuli. A hit ratio was calculated, which is quantified as the proportion of correct responses (i.e., “hits”) to total responses (i.e., “hits” plus commission errors).
- 3) Child Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001): The CBQ is a parent-report questionnaire that assesses a range of child behavior. Parents are asked to respond to 113 items indicating whether the behavior is not true (0), somewhat or sometimes true (1) or very true or often true (2) for their child. Specific to executive function, the subscales of inhibition and attention were utilized.

*Emotional Intelligence.* To date, no available measure has captured the complexity of EI in children under the age of 10, likely because the empirical structure of EI is largely unknown in younger populations. Children at six years of age demonstrate growing self-regulatory capacities (Davidov & Grusec, 2006), making it an appropriate time frame to assess EI. Assessed aspects of EI included 1) emotion knowledge and understanding and 2) emotion regulation/management. These well-studied constructs are developmentally appropriate to age 6, and map on to the EI constructs in systematic ways. A unitary latent variable was not appropriate, given the data (see “results” section). As such, two latent variables were created using the following two measures as indicators:

- 1) *The Assessment of Children’s Emotion Skills (ACES; Schultz & Izard, 1998):* ACES contains three subtests that capture children’s ability to identify and understand emotions. The facial expressions section includes 26 photographs of preschool to elementary aged children posing facial expressions. Children are asked to indicate whether the child in the photograph feels “happy”, “sad” “scared” or “mad”. Children’s *emotion knowledge* score reflects how many of the 26 photographs a child labels correctly. The social behaviors section is made up of 15 short sentences that describe prototypical behaviors related to particular emotions. Children are asked to identify whether the behaviors are more in line with a “happy”, “sad”, “mad” or “scared” emotion. The third section, social situations, contains 15 short sentences that describe situations that typically elicit a particular emotion. Children are asked to label the

protagonist's feeling with "happy", "sad", "mad", or "scared". Children's *emotion understanding* score reflects the total number of items a child answers correctly.

- 2) *Child Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher 2001)*. See above for detailed description of this measure. To best capture *emotion dysregulation* a latent variable including the following subscales was utilized: fear, sadness, falling reactivity / soothability, discomfort, and anger/frustration.

### **Covariates**

*Temperament.* Temperament has been linked to the intensity of emotional experiences in addition to regulatory strategies (Rothbart & Bates, 1998). Some argue that temperament reflects a biological basis for EI. As such, this study sought to partial out the effects of temperament from parenting effects on executive function and EI. Temperament was assessed via the Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2003) at the same time point of the parenting assessment. The negativity and regulation dimensions were utilized as possible covariates.

*Gender.* Early childhood is notable for gender differences in executive function and emotional competence with girls typically outperforming boys (Denham, Bassett, Brown, Way, & Steed, 2013; Milleva-Seitz et al., 2015). Additional evidence suggests that boys may be more sensitive to early positive parenting behaviors (Milleva-Seitz et al., 2015). As such, gender was addressed as a possible covariate within the pathways analyzed.

*Maternal Education.* Maternal education is commonly utilized as a correlate of socioeconomic status. Due to support for a link between SES and children's executive function, maternal education was considered as a control in the subsequent analyses.

### **Data Analytic Plan**

*Preliminary analyses.* Frequency distributions and descriptive statistics were run for all observed variables and relevant indicators for latent variables including demographics, infant characteristics, maternal sensitivity, emotion socialization, executive function, and emotional intelligence. Descriptives were used to examine observed means, standard deviations, and outliers. Correlations were calculated between all variables to identify the degree of linear association between predictors and outcomes at all time points. Any potential covariate that was correlated significantly with multiple variables of interest was included as a covariate within the appropriate analyses. If hypothesized covariates did not correlate with multiple variables of interest, they were removed from subsequent analyses.

*Missing data handling.* First, a check on reasons for missing data at each time point was carried out. In all analyses, full information maximum likelihood (FIML) was employed in order to include all possible data points and produce unbiased parameter estimates.

*Hypothesis testing.* Hypotheses were tested using structural equation modeling (SEM) in Mplus 8.2 (Muthen & Muthen, 2010). Maternal sensitivity and emotion socialization were entered as observed variables whereas executive function and dimensions of emotional intelligence were entered as latent variables. See figure 2 for a full measurement model. The  $\chi^2$ , CFI, and root mean square error of approximation

(RMSEA) were examined to test for general model fit. All study aims were tested within the same SEM and parameter estimates were evaluated for significance and effect size.

## **RESULTS**

### **Preliminary Analyses**

Descriptive information for demographics, relevant infant characteristics, and key study variables is presented in Table 1. Of the observed parenting behavior variables, mothers' sensitivity towards their two-year-old children was rated at an average of 3.4 (range = 1-5), suggesting that mothers were moderately sensitive. Also at child age two, mothers were rated at an average global frequency of 1.8 for their supportive emotion socialization behaviors (total possible = 12) and at an average global frequency of 1.02 for their non-supportive behaviors (total possible = 16). As evidenced by these scores, mothers did not demonstrate a high level of socialization behaviors across the interaction tasks. Mothers of ten participating children were not coded for emotion socialization due to a lack of child negative affect across all the interaction tasks.

Table 2 presents Pearson correlations for key study variables. Pearson correlations were also examined between covariates and variables of interest. Child female gender was associated with better performance on the CPT. Child temperamental negativity was negatively related to child temperamental regulation and positively related to non-supportive socialization behaviors. Child temperamental regulation was positively associated with maternal sensitivity at two years, positively associated with child attention/focus at 4.5 years, and positively associated with child soothability at 6 years. Because temperamental regulation was only correlated with independent variables (at the same time point) and single indicators from latent outcomes, it was not included as a

covariate in subsequent analyses. Maternal education and mother's country of birth were considered as potential demographic covariates. A review of the sample, however, indicated a lack of variability in the country that mothers were born with an overwhelming number being born in Mexico (86%). As such, this variable was not examined as a potential covariate. Correlations indicated mothers with more years of education had children with higher levels of inhibitory control at 4.5 years of age and higher scores on all emotion knowledge tasks at 6 years of age. As a result, this variable was included as a covariate in the full model.

*Latent variable modeling.* Prior to estimating the full SEM model, latent variables for executive function and emotional intelligence were independently modeled using confirmatory factor analyses in Mplus. The latent variable for executive function had adequate fit:  $\chi^2 (2) = 3.86$ ,  $p = .15$ ; RMSEA = .06; CFI = .951; SRMR = .04. A unitary model of emotional intelligence with all eight indicators did not adequately fit. Exploratory factor analyses in SPSS suggested two distinct latent variables (referred to as emotion knowledge and emotion management). The latent variable for emotion knowledge, modeled in Mplus using confirmatory factor analysis, was just identified resulting in perfect fit. The latent variable for emotion regulation/management, modeled in Mplus using confirmatory factor analysis, adequately fit the data:  $\chi^2 (5) = 8.392$ ,  $p = .14$ ; RMSEA = .07; CFI = .96; SRMR = .04. A three-factor measurement model was then estimated including the correlations between all three latent variables (See figure 3). This model had adequate fit according to some fit parameters:  $\chi^2 (51) = 83.108$ ,  $p = .003$ ; RMSEA = .05; CFI = .83; SRMR = .08.

## Model Results

The full structural mediation model examined the direct paths between maternal parenting behaviors (sensitivity, supportive emotion socialization, and non-supportive emotion socialization) at 2 years and dimensions of emotional intelligence at 6 years, as well as the indirect paths through executive function at 4.5 years. Maternal education was entered as a covariate. An examination of fit indicates that the model fit the data adequately:  $\chi^2(92) = 139.95, p = .0009$ ; RMSEA = .04; CFI = 0.77; SRMR = .078. A CFI below .9 is likely due to the lack of significant correlations between study variables. In addition, a significant  $\chi^2$  is not unexpected due to its sensitivity to sample size, and is not a concern in the context of other adequate-fitting indices (i.e., RMSEA and SRMR). See Figure 4 for the full model with all standardized parameter estimates.

*Direct effects of maternal parenting behaviors on EI (Aim 1) and executive function (Aim 2).* Results of the full structural model indicated non-significant direct effects of maternal sensitivity ( $\beta = .08, p = .81$ ), supportive emotion socialization ( $\beta = -.26, p = .35$ ), and non-supportive emotion socialization ( $\beta = .31, p = .37$ ) on emotion knowledge, controlling for executive function and maternal education. Similarly, maternal sensitivity ( $\beta = -.10, p = .60$ ), supportive socialization ( $\beta = -.01, p = .98$ ), and non-supportive socialization ( $\beta = .01, p = .96$ ) were not significantly related to emotion management, controlling for executive function and maternal education. In addition, results indicated non-significant direct effects of maternal sensitivity ( $\beta = .19, p = .40$ ), supportive emotion socialization ( $\beta = .18, p = .29$ ), and non-supportive emotion socialization ( $\beta = -.02, p = .96$ ) on executive function, controlling for maternal education. Regarding correlations between parenting behaviors, maternal sensitivity was

significantly negatively associated with non-supportive socialization ( $\beta = -.43, p < .001$ ), suggesting the more sensitivity mothers demonstrate, the fewer non-supportive socialization behaviors observed. Sensitive behaviors were not related to supportive socialization ( $\beta = -.13, p = .10$ ), Supportive socialization was positively and significantly correlated with non-supportive socialization behaviors ( $\beta = .55, p < .001$ ), suggesting a general tendency to use multiple socialization behaviors, both positive and negative, when child negative affect occurs.

*Indirect effect of maternal parenting behaviors on emotion knowledge and emotion management through executive function (Aim 3).* Executive function was hypothesized to be a neurocognitive prerequisite of emotional intelligence. A test of the direct effects indicated a significantly positive effect for emotion knowledge ( $\beta = .73, p < .05$ ), although the 95% confidence interval contained zero so this result is not trustworthy. Results indicated a non-significant direct effect of executive function to emotion management ( $\beta = -.29, p = .23$ ). For Aim 3, bootstrapping analyses with the MODEL INDIRECT command in Mplus were utilized to test the indirect (mediated) effects of executive function on the parenting behaviors and the latent emotional intelligence variables. Six indirect effects were calculated, three that connected each of the parenting behaviors to emotion knowledge through executive function, and three that connected each of the parenting behaviors to emotion management. As would be expected given the above results, all specific indirect effects estimated were non-significant. Furthermore, 95% bootstrapped confidence intervals contained zero, consistent with non-significant results. These findings do not support the hypothesized mediational model.



## DISCUSSION

The current study examined the longitudinal relations between parenting behaviors with two-year-old children and children's emerging emotional intelligence at six years of age. Specifically, the study sought to differentiate the influence of maternal sensitivity and emotion socialization on two dimensions of children's emotional intelligence, emotion knowledge and emotion dysregulation. Furthermore, the role of children's early executive function as one pathway by which parenting affects emotional intelligence was explored. A secondary goal of the study was to identify overarching variables for aspects of executive function and emotional intelligence. Results of a structural equation model highlighted the adequacy of a latent variable for executive function that included both observed and parent-reported measures. Interestingly, the findings suggested that a unitary model of emotional intelligence was not adequate, whereas dividing this variable into two dimensions of emotional intelligence was more appropriate. Central to the study aims, results did not suggest that early parenting behaviors were directly predictive of emerging emotional intelligence, nor did parenting relate to children's executive function. Although executive function was not implicated as a significant factor in a larger pathway of influence, preschool children with better executive function had stronger emotion knowledge ability at 6 years of age than children with poorer executive function.

### **Parenting and Emotional Intelligence**

The first aim of the study was to examine the effects of distinct parenting behaviors on children's emerging emotional intelligence. Importantly, there are few studies that jointly examine parenting behaviors within the same model. Somewhat

surprisingly, results did not support a link between maternal sensitivity or emotion socialization and the measured dimensions of children's emotional intelligence (i.e., emotion knowledge and emotion dysregulation). A number of explanations for these non-significant findings are offered here.

This study sought to predict emotional intelligence when children were 6 years of age from parenting behaviors with 2-year-old children. It is apparent, however, that the proximity of a predictor to an outcome influences the extent to which a relation is likely to be found. This may be especially important for parenting behaviors, which become more consistent as children get older. When multiple time points are included in a study, the more proximal time point often exerts a stronger influence on the outcome than more distal time points. For example, in a study that examined the impact of parenting at two time points (children 2 and 4 years of age) and their relation to children's emotion knowledge, parenting at age 4 was correlated with the outcome of interest (measured at age 4), whereas the more distal time point was not (Bennett, Bendersky, & Lewis, 2005). This may explain why studies often do not span a large number of years without including intervening variables that may demonstrate multiple pathways of influence. Similarly, although supportive evidence had linked parenting to emotional intelligence, the length of time between assessments in previous studies was often shorter than in the current study. A brief review of the literature on parenting suggests that a one to three year span is commonly employed (e.g., Castro, Halberstadt, Lozada, & Craig, 2014; Denham, Zoller, & Couchoud, 1994; Karstad, Wichstrom, Reinfjell, Belsky, & Berg-Nielson, 2015). In all of these studies, children's emotion understanding / knowledge was predicted from parenting variables, but the temporal span was only two years. The

significant relation between the proximity of parenting and outcomes of interest could also reasonably be due to the developmental timing of assessed parenting behaviors. For example, for some parents, emotion coaching may not be deemed an important parenting practice for 2 year old children, but their attitudes may shift as children get older. In this same vein, the meaning of sensitive parenting may change across children's early development (Lohaus, Keller, Ball, Voelker, & Elben, 2004). As such, there may be variations in the association between parenting and emotional intelligence depending on the timing of parenting measurement.

The current study sought to connecting parenting of children at age 2 with children's emotional intelligence at age 6. During the four-year span of time in between assessments of parenting and emotional intelligence however, children start school and experience the added influence of the environment outside the home. As a result, the impact of parenting may diminish over time as the influence of other environmental factors increase. Indeed, Bronfenbrenner's bioecological model illustrates the importance of considering multiple factors that can effect children's development (Bronfenbrenner & Morris, 1998). Consistent with this perspective, exposure to negative emotion in the greater neighborhood environment, especially among children in poverty, has been linked to reduced emotion learning (Harris, 1994). Negativity in the environment may preclude children's ability to effectively process emotion-based information, regardless of parents' behaviors.

The relative importance of the proximal family and neighborhood environment may lessen as children enter center-based childcare and/or preschool. Some estimate that more than half of children under six from low income families spend at least 15 hours per

week outside the home in early care or education settings (Adams, Tout, & Zaslow, 2007). Whereas parents are influential during the infancy and toddler years, teachers may become a primary source of emotion socialization for older children. Teachers may serve a particularly important role for children within at-risk environments (i.e., low SES, high conflict). Indeed, children from low-income families who attend high quality early education programs are generally better adjusted and demonstrate reduced behavior problems compared to children who attend low-quality programs or stay at home (Burchinal, Roberts, Zeisel, Hennon, & Hopper, 2006). Beyond the quality of the early education program, the teacher-child relationship can have a direct impact on children's emotional competencies. When teachers provide high levels of emotional support, children demonstrate less negativity and reduced aggression as compared to teachers who are limited in the emotional support that they provide (Zinsler, Bailey, Curby, Denham, & Bassett, 2013). As a result of this line of research, a number of programs have been established that target teachers and the school environment. The role of peer relationships on children's emotional outcomes deserves more attention, as well. Some evidence links positive peer interactions with socio-emotional competence, (Gagnon & Nagle, 2004), more engagement in the learning environment, high levels of attentiveness, and reduced problem behaviors (Coolahan, Fantuzzo, Mendez, & McDermott, 2000).

Overall, it appears as though there are additional, school-related factors that may exert an influence on children's emotional outcomes over and above the impact of early parenting. Alternatively, there may be an indirect effect of school experiences on the relation between parenting and children's emotional intelligence. The inclusion of this

additional context as a pathway may have more accurately reflected the complexity of child development.

Although this study included a relatively comprehensive assessment of positive parenting that included both sensitivity and emotion socialization, there are other parenting behaviors that may be more closely related to emotion knowledge and emotion dysregulation. For example, Denham and colleagues (1994) found that mothers' use of emotional language with their preschoolers was related to children's emotion knowledge a year later. Similarly, Halberstadt and colleagues (1999) identified a link between maternal expressivity and emotion knowledge. There may be something unique about emotional language that was not well captured in the current study. Of note, mother's emotional language was coded within the emotion socialization coding system, but an examination of the data suggested that there was little to no variability within this behavior. Indeed, less than 5% of mothers used emotional language with their two year olds. Despite its purported connections to emotion knowledge, mothers' use of emotion language may not be frequently observed with younger children and may not become prevalent or measurable until children regularly verbalize their feelings (i.e., between 3 and 5 years of age; Bretherton, Fritz, Zahn-Waxler, & Ridgeway, 1986). Around this time, children are also better able to communicate the antecedents and consequences of particular emotions (Stein & Trabasso, 1989), which may prompt mothers to use more emotion language. In addition to age-related differences in emotion talk, maternal education, knowledge about development, family size, and socioeconomic status have all been linked to mothers' use of emotion language (Degotardi & Torr, 2007; Garrett-Peters et al., 2008; Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003). As such, an ecologically-

and culturally-informed approach may explain why the mothers in the current sample utilized low levels of emotion talk.

Participants for the current study included Mexican-American mothers and their children. Numerous studies and review papers highlight that parenting beliefs, attitudes, and behaviors differ across cultures (Bornstein, 2012; Bornstein, 2015; Diaz & McClelland, 2017). Thus, the non-significant connections between early parenting and emotional intelligence may be due to cultural-specific factors. For example, although nurturance and socialization are considered universal parenting behaviors, the timing and manner with which they are provided to children is culturally-specific (Bornstein, 2007). In the current sample, mothers rarely elaborated on their children's behaviors or verbalizations, and demonstrated low levels of affectionate touch, despite the inclusion of these behaviors in the Western conceptualization of maternal sensitivity. In addition, mothers utilized more problem solving and ignoring of negative behavior than any other socialization behaviors. Overall, though, mothers demonstrated a relatively low frequency of the assessed emotion socialization behaviors. One can speculate that Mexican-American mothers do not view socialization of emotion as a priority for their 2-year-old children. Alternatively, their use of socialization behaviors may differ from how it's traditionally defined. Culture also influences the childrearing goals that parents have. For Mexican-American families living in impoverished areas, survival may be more important than socioemotional competence, thus reducing parents' focus on emotional development. In addition, there may be culturally-specific emotion socialization practices. For instance, minority children are now being taught earlier than ever before to demonstrate high levels of deference and low levels of anger towards

authority figures. This underscores the importance of understanding how sensitivity and emotion socialization operate within Mexican-American households, as well as their implications on child development.

The results of this study may also be due to a degree of heritability in emotional intelligence that was not accounted for. Some research has highlighted a positive relation between cognitive ability (i.e., IQ) and emotional intelligence (i.e., Bennett, Bendersky, & Lewis, 2005). Given the genetic contribution to IQ (see Beaver, Schwartz, Connolly, Nedelec, Al-Ghamdi, & Kobeisy, 2013 for a relevant review), dimensions of emotional intelligence such as emotion knowledge may also be more heritable than not. In their study of 188 4-year-old children, Bennett and colleagues (2005) determined that the effects of parenting on children's emotional intelligence disappeared in the context of children's academic and cognitive ability. This is consistent with studies that have identified high correlations between emotional intelligence and cognitive ability / verbal ability. In a 2012 study, Alegre found a lack of relation between parenting styles and trait emotional intelligence, concluding that emotion-specific characteristics of parenting might contribute to emotional intelligence over and above parenting styles. It's also plausible to conclude, though, that aspects of emotional intelligence are less amenable to environmental influences. Although IQ data was not available for the current study, it would be important to examine the effects of IQ on these emotional intelligence variables as this would help to clarify the relative importance of biological versus environmental contributors to emotional intelligence.

*Maternal Sensitivity and Emotional Intelligence.* Maternal sensitivity has long been conceptualized as a broad construct that encompasses a number of interrelated

behavioral and affective characteristics (Thompson, 1997). Sensitive parenting is related to secure attachment (Van IJzendoorn et al., 2007), children's positive adjustment (Shaw, Keenan, & Vondra, 1994), and children's emotional competence (Watson et al., 2014), among many other characteristics. Given its positive relation to an abundance of competencies in children, maternal sensitivity was conceptualized to be a critical dimension of a child's early environment in the current study. Unexpectedly, results of this study did not support a relation between early maternal sensitivity and later dimensions of emotional intelligence. One possible explanation is that the presence of harsh or negative parenting is more impactful to children's emotional development than is the absence of sensitive parenting. Indeed, Denham (1998) suggested that parent's intense negative affect may inhibit emotional learning. Furthermore, there is evidence for a relation between physical abuse and children's emotion understanding (Shipman & Zeman, 1999). The participants in the current study are relatively low resourced and high risk. It was hypothesized that positive parenting practices would provide protective value for children's emotional development. Importantly, though, negative parenting practices may be more salient than positive parenting for those children in high-risk environments.

*Emotion Socialization and Emotional Intelligence.* Although maternal sensitivity is considered a broad parenting construct, emotion socialization has a much narrower focus on the way parents respond to their children's' emotions. Even more specifically, this study examined how mothers respond to their children's negative affect, given that responses to distress are generally thought to be predictive of later competencies. This study included an examination of both supportive and non-supportive socialization behaviors, the former presumably predictive of positive competencies in children and the



latter presumably predictive of less ideal outcomes (Jones, Eisenberg, Fabes, & MacKinnon, 2002). Consistent with maternal sensitivity findings described earlier, emotion socialization (supportive and non-supportive) did not relate to dimensions of emotional intelligence. These non-significant effects may be attributable to measurement error. In the current study, emotion socialization was assessed by behaviorally coding mothers' interactions with their children. The coding system was based on a parent-report questionnaire that examines the different supportive and non-supportive ways mothers respond to their children's negative affect. Although typically considered as a methodological strength, using an observational method may have precluded an accurate depiction of mothers' behaviors. The observational method relied on children exhibiting negative affect that could be responded to in some way by mothers. However, most children displayed only low intensity negative affect (i.e., whining) which may have limited the frequency and variability of mothers' responses. In addition, mothers may have been hesitant to engage in some of the non-supportive behaviors (e.g., punitive) while being observed. Socialization behaviors were also only captured when children exhibited some level of negative emotion. Children who did not demonstrate negativity or only demonstrated low levels of negativity precluded opportunities for their mothers to demonstrate socialization behaviors. These children may have been well socialized but this was not captured in the way the behaviors were coded in this study. It may be then that mothers' report of their responses might have actually been more valid.

In addition, parents tended to utilize specific socialization behaviors far more than others. To best capture socialization, all supportive behaviors were combined into one variable and all non-supportive behaviors were combined into another variable. The

decision to combine in this fashion was due to low variability within and across some of the behaviors. In this sample, problem solving (supportive) and ignoring (non-supportive) were observed more than other behaviors. Maternal encouragement of negative emotion (supportive) and distress reactions (non-supportive) were far less utilized. Although no studies have directly compared age-related differences in specific socialization behaviors, it is possible to speculate that these latter behaviors may be observed in parents of older children but may not be subjectively considered as critical dimensions of socialization for two year olds. A more precise coding system, specifically for this younger age group, may be warranted.

### **Parenting and Executive Function**

The second aim of this study was to examine the direct effects of parenting on children's early executive function. Extant evidence suggested that positive parenting practices have a small, but meaningful effect on children's executive function. For example, in addition to the variables assessed in the current study, factors of attachment security, mind-mindedness, and autonomy support have been linked to executive function during toddlerhood (Bernier, Carlson, & Whipple, 2010). These previously established relations suggest that the results of the current study can be considered somewhat surprising. When interrelated indices of executive function are combined, maternal sensitivity and emotion socialization may not be salient predictors of the global construct. In their study combining sensitivity, mind-mindedness, and autonomy support, Bernier and colleagues (2010) identified autonomy support as the strongest predictor of executive

function. Similarly, other parenting behaviors like maternal scaffolding at age two have been linked concurrently and longitudinally to children's executive function (Bibok, Carpendale, & Muller, 2009; Hughes & Ensor, 2009). Maternal scaffolding involves mothers providing support to their children during problem solving activities. Children with mothers who appropriately scaffold their behaviors are often able to think more critically and abstractly. In their longitudinal study of 125 children, Hughes & Ensor (2009) identified maternal scaffolding, observational learning (i.e., modeling), and an adverse family life as predictors of executive function. Consistent with the findings of the current study, they did not find an association between positive family interactions and executive function. It's possible that negative parenting behaviors (i.e., intrusiveness), and more focused problem-solving parenting behaviors (i.e., scaffolding) are more salient for the development of executive function than are general positive parenting behaviors. On the the whole, the evidence suggests that the variables chosen to represent parenting in this study may not have been those that are most central to the emergene of children's early executive function.

It's also plausible that parenting could be unimportant overall, and the emergence of executive function is tied predominantly to biological factors. Indeed, a psychobiological framework may be more cohesive and comprehensive, especially given that executive function reflects a basic neurocognitive skill. Supportive evidence indicates that executive function is heritable to some degree. Friedman and colleagues (2008), in a twin study, make the strong assertion that genetic differences entirely explain individual differences in executive function. Additional twin studies provide corollary support for the intergenerational transmission of executive function (i.e., Jester et al.,

2011). Nonetheless, a more nuanced view posits that executive function has a degree of heritability (between 45-50%), but environmental influences still explain some of the variance. Such a proposition is supported by a study that included both mother's executive function, which was considered a proxy for heritability, and negative parenting in one model. Results indicated a combined influence of parenting (averaged across 10, 24, and 36 months) and mother's executive function for children's executive function at 36 months (Polderman et al., 2006). Although the project from which the current study was drawn does not have phenotypic information, a measure of mothers' executive function may help differentiate the biological and environmental (i.e., parenting) influences.

There is also research that highlights a potential neural mechanism associated with low SES that contributes to disparities in children's executive function (Noble, McCandliss, & Farah, 2007). From this bioecological framework, there are enduring and significant effects of disadvantage on brain development. Importantly, the first few years of life are a time when the developing brain may be most sensitive to the deleterious effects of a low SES environment. Indeed, in children from low-income families, research has identified a reduction in cortical gray matter in the prefrontal cortex, an area of the brain critically important for executive function (Noble et al., 2015). Additional studies have identified reduced integrity of cerebral white matter tracts for children from low SES families (Ursache & Noble, 2016). Participating families in the current study are impoverished, their access to resources is limited, and mothers' education level is considerably lower than the general population. Their SES may contribute more directly to children's developing executive function than initially considered. Indeed, although

not a central aim of this study, mothers with more education had children with better executive function. Although environmental influences may mediate the relation between SES and children's executive function, underlying structural brain differences during development may also directly explain the individual differences, especially for low-income families. It may be important to consider that the relative effects of parenting on executive function may differ for at-risk, low SES children compared to their advantaged counterparts. Whereas parenting behaviors like maternal sensitivity and emotion socialization may impact executive function for children without additional environmental stressors (i.e., low SES), more salient parenting behaviors (i.e., increased linguistic input) may be needed for children already under environmental stress. Together with the heritability research detailed above, an integrated bioecological model may best represent the complex development of executive function. That said, the relative contribution of parenting, SES, and genes may depend on their combination/interaction. Indeed, all three are important, but their ability of any individual risk factor to have an influence on executive function might depend on the level of risk in the other two. For example, children in low SES environments may not benefit as much from warm/sensitive parenting if they have mothers with poor executive function abilities. In this scenario, the genetic influence and the effects of the environment may make generally positive parenting practices less effective.

### **Executive Function as a Neurocognitive Precursor to Emotional Intelligence**

The final aim of this study was to uncover a possible pathway by which parenting affects emotional intelligence. Aspects of executive function were posited to be a neurocognitive precursor to dimensions of emotional intelligence. Despite a lack of a

direct connection between parenting and executive function, results partially supported this “neurocognitive precursor” hypothesis. Children’s executive function was positively and prospectively associated with their emotion knowledge, but was not related to their emotion dysregulation. Given the instability of the former parameter estimate, validation requires replication of this result in other studies. If true, this association is promising and highlights the important contribution of children’s early neurocognitive development on their ability to understand, label, and differentiate emotions. This finding underscores the critical need to understand the biological and environmental contributions on children’s executive function.

The lack of an association between executive function and emotion dysregulation found in this study may be due to the way emotion dysregulation was measured. Emotion dysregulation was measured via parent-report of children’s behavior and emotions. Children’s regulatory behavior in everyday life is not always consistent with their actual capacity to regulate their emotions. A child may have the ability to regulate their emotions, but their behavior is impacted by environmental factors. As such, a more direct measurement of children’s emotion regulatory behaviors may have fit better with the conceptualization of emotional intelligence as an intrinsic ability, and not just a behavioral competency.

### **Factor Structure of Executive Function and Emotional Intelligence**

There is some controversy surrounding the components that make up executive function and emotional intelligence. With regard to executive function, there are arguments for and against a unitary model. For emotional intelligence, the argument extends further to whether a construct called emotional intelligence even exists.

This study combined two objective measures and two parent-report subscales of inattention and inhibitory control to create a latent index of executive function. Executive function, however, has been conceptualized as broader than just attention and inhibitory control. Therefore, it is possible this study did not accurately capture the full extent of executive function. In addition, there is some evidence that executive function should not only be conceptualized as a unitary construct, but rather it should be conceptualized as interrelated, but unique, components. This model, sometimes called the “unity and diversity” model (Miyake et al., 2000), mostly examined in young adults, suggests that there is a broad ability known as executive function, but it is also comprised of unique components that may differentially relate to outcomes. On the other hand, there is evidence that a unitary model may be parsimonious for younger children (e.g., 2-9 years of age) and a differentiated model of executive function becomes more important as children get older (Brydges, Fox, Reid, & Anderson, 2014). From this perspective, the broad ability develops rapidly, consistent with early brain development, and differentiation may not occur until later due to individual components developing at different rates. Accepting this developmental perspective, the current study’s conceptualization of executive function as a unitary construct is appropriate, although the inclusion of other correlates of executive function may be warranted.

Although executive function has received considerable support as a defined construct, emotional intelligence has not. Definitions of emotional intelligence have included, among other things, aspects of social skills, empathy, motivation, personality, and emotional abilities (Goleman, 1995; Goleman, 1998; Mayer & Salovey, 1997). There are also questions as to whether these competencies are simply correlated with emotional

intelligence or are part of an overarching construct. Given these discrepancies, it is not surprising that psychometric attempts to create a unified factor structure of emotional intelligence have been limited. One of the more commonly used latent constructs of emotional intelligence includes emotion use, emotion understanding, emotion regulation, and emotion knowledge. This construct, however, has been exclusively examined in adult populations. The current study attempted to examine a similar factor structure in children, but was not successful, suggesting that a downward extension of the adult model of emotional intelligence may not be warranted. Results did not support a unified construct and potentially highlight a differentiated perspective of emotional intelligence for children. In contrast to executive function, emotional intelligence may take longer to become a cohesive developmental skill, due to individual aspects developing at different rates. For example, children may be able to identify and understand emotions prior to being able to effectively regulate them. A developmental perspective of emotional intelligence is necessary to move the field closer to being able to measure this factor in young children.

Given that no measure of EI exists for children, available measures were combined to create the closest EI measure as possible. In hindsight, this was only marginally successful. Whereas the variable of emotion knowledge appears to fit with extant definitions of emotional intelligence, the emotion dysregulation variable utilized here may not. The creation of a validated and reliable performance test for child emotional intelligence might help determine the organizational structure of emotional intelligence within this population.

### **Study Limitations**



Exploring children's emotion development from a longitudinal perspective is a core strength of the current study. Furthermore, multiple variables of interest were included with a significant amount of psychometric work dedicated to estimating latent variables of executive function and emotional intelligence. The non-significant effects of this study may have been attributable to the sample size ( $n = 269$ ) coupled with a large number of included variables ( $n = 15$ ). This combination may have resulted in low power. In addition, by using latent variables, an examination of the predictive power of individual components of the latent variables was not examined. For example, parenting may not have an effect on executive function as a unitary construct, but rather it may differentially relate to individual components. This was supported by a post-hoc analysis that examined the relation between maternal sensitivity and the distinct indicators that comprise the executive function latent variable. Results indicated that maternal sensitivity related to one objective measure of inhibitory control and sustained attention (i.e., hit ratio) but not the other (heads-toes-knees-shoulders; HTKS), and it did not contribute to mothers' report of their children's attention and inhibitory control.

Furthermore, by including overlapping parenting behaviors, the unique impact of the individual behaviors may have been overshadowed. These individual variables may in fact be insignificantly related to outcomes of interest. Alternatively, it may be that these individual variables are competing for significance. Sometimes the most parsimonious models are models that include fewer variables, although it's impossible to deny the inherent complexity involved in children's development. As a result, studies often include multiple contributory variables. The notion that the variables are competing is partially supported in the current data. For example, when supportive emotion

socialization is examined separately from non-supportive emotion socialization, it significantly accounts for aspects of executive function.

### **Summary and Conclusions**

This study is among the first to explore longitudinal associations between multiple parenting behaviors, children's executive function, and children's emerging emotional intelligence. Although the main hypotheses were not supported, important implications were uncovered. Most importantly, preschooler's executive function was linked, prospectively, to their emotion knowledge. If this result is replicated in future studies, it provides an important neurocognitive argument for the development of children's emotion knowledge. It will then be critical to understand the biological and environmental influences on the development of executive function. Finally, a lack of an association between parenting and emotional intelligence on the one hand, and parenting and executive function on the other, suggests that executive function and emotional intelligence may be more heritable than previously considered. Alternatively, they may be attributable to other environmental factors not examined here. Overall, a bioecological perspective is warranted and would lead to a more precise and comprehensive understanding of these complex processes.

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APPENDIX 1  
TABLES AND FIGURES

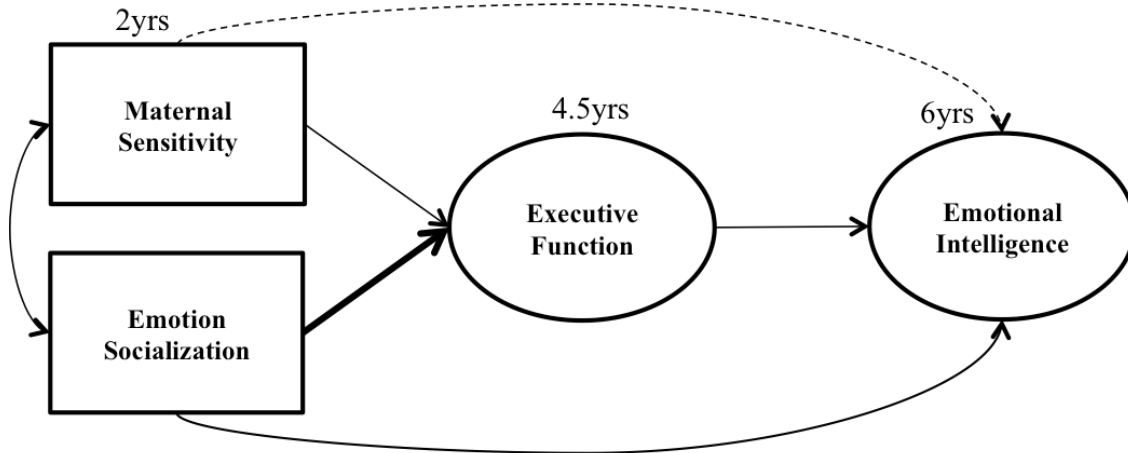


Figure 1. Conceptual Model

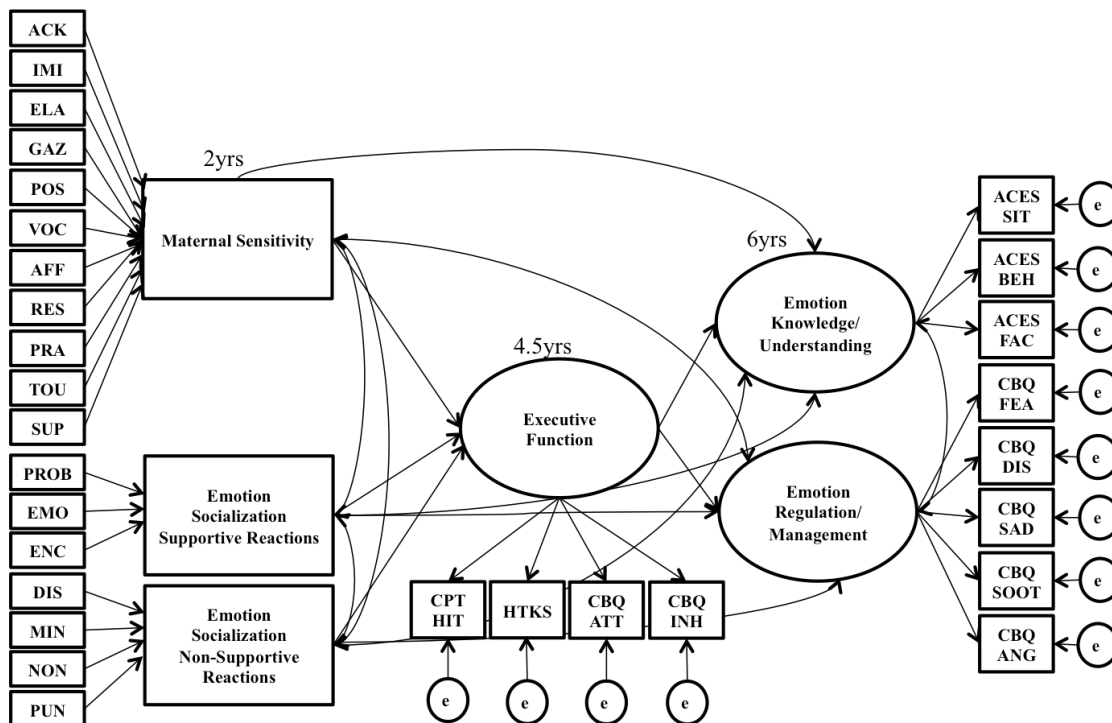


Figure 2. Proposed measurement model. ACK = Acknowledging, IMI = Imitating, ELA = Elaborating, GAZ = Parent Gaze. POS = Positive Affect, VOC = Appropriate Vocalizations, AFF = Appropriate Range of Affect, RES = Resourcefulness, PRA = Praise, TOU = Affectionate Touch, SUP = Supportive Presence; PROB = Problem Focused, EMO = Emotion Focused, ENC = Expressive Encouragement; DIS = Distress, MIN = Minimizing, NON = Nonresponse, PUN = Punitive; CPT = Continuous Performance Task, HIT = Proportion of Correct Presses/Total Responses, CBQ = Child Behavior Questionnaire, ATT = Attention, INH = Inhibitory Control; ACES = Assessing Children's Emotion Skills, SIT = Situations, BEH = Behaviors, FAC = Facial Expressions, FEA = Fear, DIS = Discomfort, SAD = Sadness, SOOT = Soothability, ANG = Anger.

Table 1  
*Descriptive Information*

	<b>Mean (SD); range</b>
<i>Mother Characteristics at Prenatal Visit</i>	
Age (years)	27.80 (6.47); 18-42
Country born (% US)	13.80%
Years in US	11.92 (5.97); 0-32
Preferred Language (% Spanish)	82.20%
Marital Status (% Married or Living together)	77.50%
Level of Education (% High school diploma)	41%
Income	\$10,001 - \$15,000 (Median)
Number of People Supported by Income	4.33 (1.99); 1-14
<i>Infant Characteristics / Covariates</i>	
Gender (% female)	54.10%
Temperament (2 years)	
Infant Behavior Questionnaire: Negativity	3.33 (.74); 1.51-5.49
Infant Behavior Questionnaire: Regulation	5.52 (.63); 3.15-6.83
<i>Key Study Variables</i>	
Maternal Sensitivity (2 years)	3.42 (.11); 1.88-3.94
Emotion Socialization: Supportive (2 years)	1.02 (1.04); 0-5.67
Emotion Socialization: Non-Supportive (2 years)	1.81 (1.41); 0-10.50
Executive Function Indicators (4.5 years)	
Continuous Performance Task Hit Ratio	.50 (.27); 0-1
Head-Toes-Knees-Shoulders	.19 (.31); 0-1
Child Behavior Questionnaire	
Inhibitory Control	4.51 (.85); 2-7
Attention/Focus	4.50 (.80); 2.50-7
Emotion Knowledge Indicators (6 years)	
Assessing Children's Emotion Skills	
Situations	.54 (.14); .08-.92
Behaviors	.45 (.18); .08-.92
Facial Expressions	.80 (0.13); .25-1
Emotion Dysregulation Indicators (6 years)	
Child Behavior Questionnaire	
Discomfort	4.39 (.91); 2-6.67
Sadness	4.19 (.66); 2.43-5.71
Fear	4.30 (1.05); 1-6.50
Anger/Frustration	4.44 (1.03); 1.67-6.83
Falling Reactivity & Soothability	4.52 (.92); 2.50-7

Table 2

## Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Maternal Sensitivity (2yrs)	-														
2. Supportive ES (2yrs)	-.13	-													
3. Non-Supportive ES (2yrs)	<b>-.44</b>	<b>.55</b>	-												
4. CPT hit ratio (4.5years)	<b>.27</b>	<b>.19</b>	<b>.05</b>	-											
5. HTKS (4.5years)	<b>.02</b>	<b>.02</b>	<b>-.03</b>	<b>.26</b>	-										
6. CBQ inhibitory control (4.5yrs)	-.01	<b>.07</b>	<b>.10</b>	<b>.15</b>	<b>.21</b>	-									
7. CBQ attention/focus (4.5yrs)	<b>.04</b>	<b>-.05</b>	<b>-.09</b>	<b>.13</b>	<b>.13</b>	<b>.30</b>	-								
8. ACES situations (6yrs)	<b>.06</b>	<b>-.04</b>	<b>.09</b>	<b>.22</b>	<b>.17</b>	<b>.10</b>	<b>.11</b>	-							
9. ACES behaviors (6yrs)	<b>.12</b>	<b>.01</b>	<b>.08</b>	<b>.21</b>	<b>.21</b>	<b>-.06</b>	<b>.04</b>	<b>.34</b>	-						
10. ACES facial expressions (6yrs)	<b>.15</b>	<b>.10</b>	<b>.00</b>	<b>.39</b>	<b>.13</b>	<b>.17</b>	<b>.06</b>	<b>.22</b>	<b>.35</b>	-					
11. CBQ discomfort (6yrs)	-.04	<b>.10</b>	<b>.05</b>	<b>.03</b>	<b>.13</b>	<b>.01</b>	<b>.05</b>	<b>.02</b>	<b>.13</b>	<b>-.03</b>	-				
12. CBQ sadness (6yrs)	-.10	<b>.02</b>	<b>.05</b>	<b>-.16</b>	<b>-.09</b>	<b>-.12</b>	<b>.02</b>	<b>-.11</b>	<b>.02</b>	<b>-.03</b>	<b>.33</b>	-			
13. CBQ fear (6yrs)	-.01	<b>-.00</b>	<b>-.05</b>	<b>.05</b>	<b>-.01</b>	<b>.12</b>	<b>.10</b>	<b>-.27</b>	<b>-.07</b>	<b>.00</b>	<b>.23</b>	<b>.22</b>	-		
14. CBQ anger/frustration (6yrs)	-.09	<b>-.15</b>	<b>-.04</b>	<b>-.30</b>	<b>-.06</b>	<b>-.10</b>	<b>-.17</b>	<b>-.03</b>	<b>.10</b>	<b>.04</b>	<b>.23</b>	<b>.44</b>	<b>.30</b>	-	
15. CBQ soothability (6yrs)	<b>.27</b>	<b>-.10</b>	<b>-.21</b>	<b>-.05</b>	<b>.12</b>	<b>.17</b>	<b>.07</b>	<b>.07</b>	<b>-.15</b>	<b>.05</b>	<b>-.22</b>	<b>-.20</b>	<b>-.28</b>	<b>-.40</b>	-

Note. IBQ = Infant Behavior Questionnaire; ES = emotion socialization, CPT = continuous performance task, HTKS = head toes knees shoulders, CBQ = Child Behavior Questionnaire, ACES = Assessing Children's Emotional Skills; Pairwise deletion was used; n's ranged from 70 to 200; Bolded values indicate that correlations are statistically significant at  $p \leq .05$ .

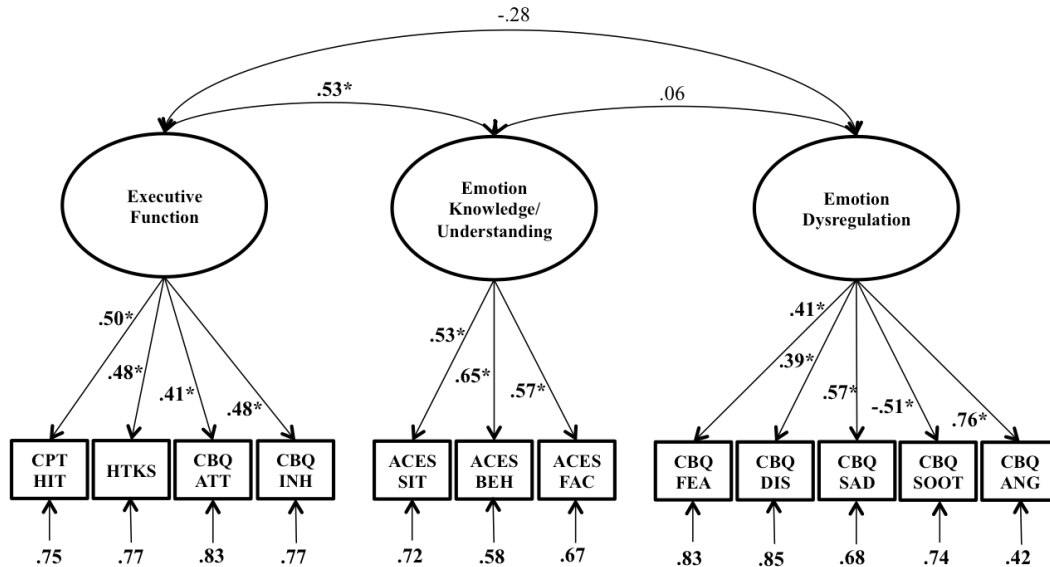


Figure 3. Three factor measurement model. Factor loadings and correlations are expressed as standardized coefficients; \* =  $p < 0.05$ ; CPT = Continuous Performance Task, HIT = Proportion of Correct Presses/Total Responses, CBQ = Child Behavior Questionnaire, ATT = Attention, INH = Inhibitory Control; ACES = Assessing Children's Emotion Skills, SIT = Situations, BEH = Behaviors, FAC = Facial Expressions, FEA = Fear, DIS = Discomfort, SAD = Sadness, SOOT = Soothability, ANG = Anger/Frustration

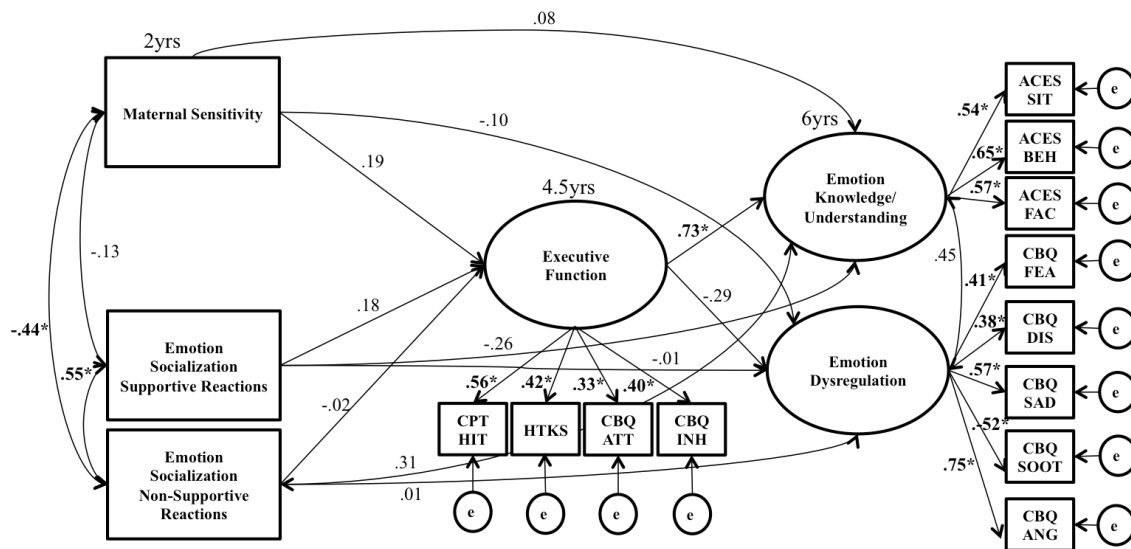


Figure 4. Full structural equation model. Maternal education was included as a covariate (paths not shown in the figure). Estimates are expressed as standardized coefficients; \* =  $p < 0.05$ ; PROB = Problem Focused, EMO = Emotion Focused, ENC = Expressive Encouragement; DIS = Distress, MIN = Minimizing, NON = Nonresponse, PUN = Punitive; CPT = Continuous Performance Task, HIT = Proportion of Correct Presses/Total Responses, CBQ = Child Behavior Questionnaire, ATT = Attention, INH = Inhibitory Control; ACES = Assessing Children's Emotion Skills, SIT = Situations, BEH = Behaviors, FAC = Facial Expressions, FEA = Fear, DIS = Discomfort, SAD = Sadness, SOOT = Soothability, ANG = Anger